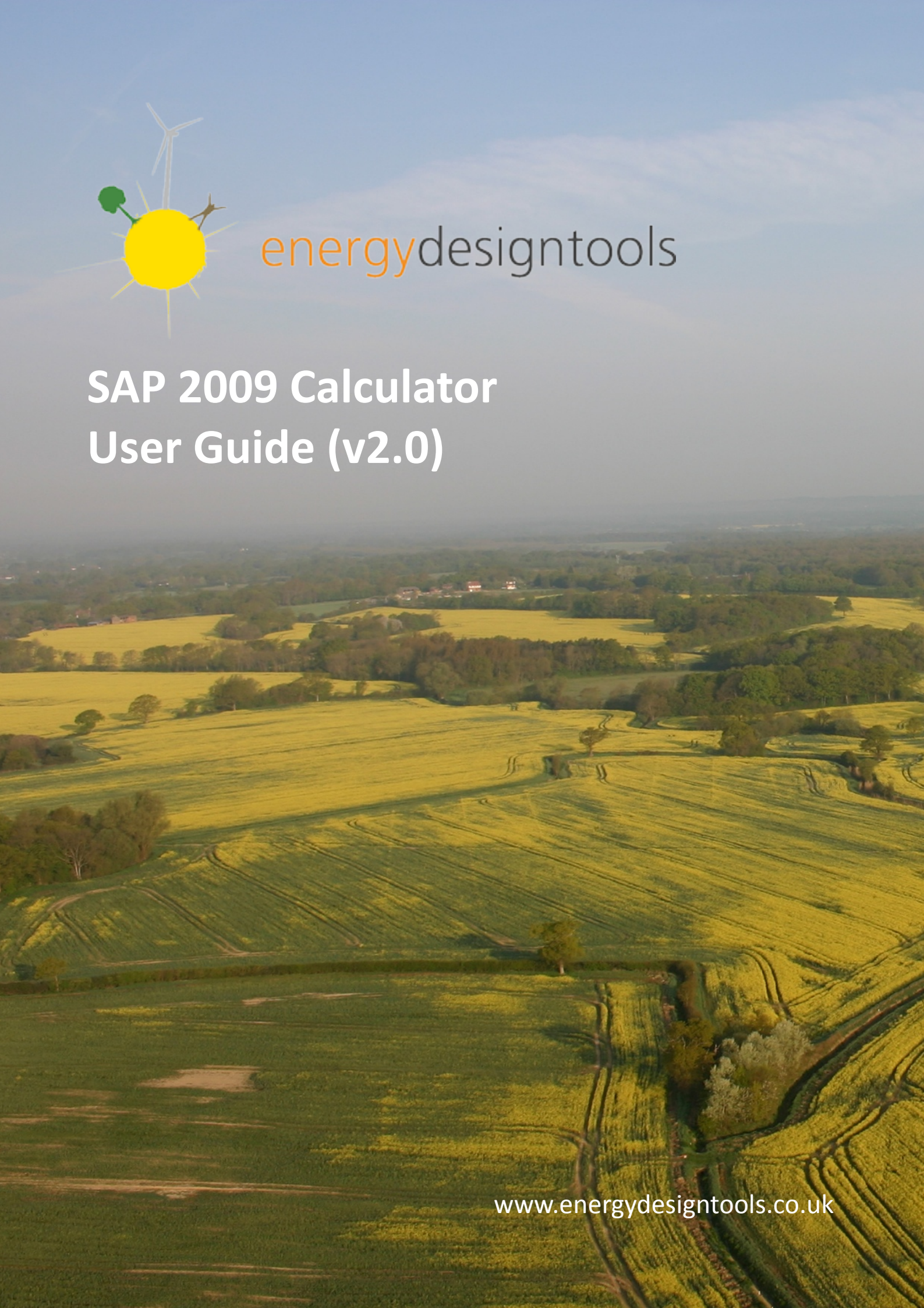
energydesigntools

SAP 2009 Calculator
User Guide (v2.0)



www.energydesigntools.co.uk

About the Energy Design Tools SAP 2009 Calculator.

The Energy Design Tools SAP 2009 Calculator v4.1 is a web-based tool used for calculating energy assessments for new build dwellings in accordance with SAP 2009 and Part L 2010 (in England and Wales) / Technical Handbook 2010 (in Scotland). The calculator is approved by the BRE for regulations compliance in England and Wales and Scotland. For assessments in Northern Ireland, SAP 2005 must be used for compliance and so it is recommended that you use the BRE-approved Energy Design Tools SAP 2005 calculator v3.2.

The software calculates Fabric Energy Efficiency (FEE), SAP, Dwelling Emission Rating (DER) and Target Emission Ratings (TER). You will be able to generate PDF versions of Input Data, Worksheets, Compliance checklists and Energy Performance Certificates suitable for submission to Building Control. For dwellings in England and Wales, we work with Architectural EPC (www.architectual-epc.co.uk) an accreditation scheme for New build energy assessors. We offer members of A-EPC a discount on our software and a bridge to allow you to send SAP calculations and Energy Performance Certificates to your user area on the Architectural-EPC website for lodgement on the new build register.

We will be updating this user manual from time to time and if there is any information that you believe to be missing then please let us know by emailing support@energydesigntools.co.uk and we will include this in the next iteration.

Useful websites and links to important documents

http://www.bre.co.uk/sap2009/
The BRE are responsible for testing and approving SAP software. The most up to date SAP documents and supporting information are available to view here.

http://www.bre.co.uk/filelibrary/SAP/2009/SAP-2009_9-90.pdf
Latest version of the complete SAP 2009 document

http://www.bre.co.uk/filelibrary/SAP/2009/SAP_Conventions.pdf
Useful document providing an explanation of some of the conventions used in the SAP document and the EDT SAP calculators.

http://www.scotland.gov.uk/Resource/Doc/217736/0102070.pdf
Scottish Technical Handbook (SAP calculations are required for compliance with Section 6, Energy)

http://www.planningportal.gov.uk/uploads/br/BR_PDF_ADL1A_2006.pdf
Part L 2010

http://www.architectural-epc.co.uk/SchemeInformation.aspx
Website for Architectural EPC, the accreditation scheme run by CIAT and RIBA.

Accessing the SAP 2009 calculator

To access the SAP 2009 calculator click on the “Start using the SAP 2009 calculator v4.1” arrow on the main page.

We are still continuing to maintain and develop our SAP 2005 software, and this can be accessed by clicking the “Go” button next to the “SAP 2005 calculator v3.2” box.

Functionality has been added into the View/Edit menu of the SAP 2005 calculator to allow you to export existing projects into the SAP 2009 calculator. To do this, simply locate the project that you wish to export and select “Export to SAP 2009” in the dropdown actions box. Click “Go” and a popup window will open walking you through the process. Please note that while we have tried to make the export as accurate as possible, there are significant differences between the 2 calculations that may mean some information is not transferred correctly. For this reason we recommend that you go through the new project before generating output documents.

Conventions used in the calculator

Navigation through the calculator is designed to be linear, starting from the top of the left hand menu to the bottom. On submission of each section you will normally be forwarded to the next section, however you can view and edit any section by just clicking the link on the left hand side. Bear in mind that certain options are dictated by options selected previously (for example, choice of water heating may depend upon primary or secondary heating selections) so it is best to complete the sections in order.

Options within a page that you do not have to complete will be marked in grey text with a light grey background; however these may become active depending upon other selections in the page.

On each page it is important to click the “submit” or “add” button when you are done. This ensures that your information has been entered and added to your project results. For this reason we recommend that you enter the information in the suggested order, and only after this point use the left hand menu for navigation.

Completion of each section is denoted using a red cross/green tick on the left hand menu. Once all of the sections are marked with a green tick the results of the calculation (FEE, SAP, DER, TER), will be displayed in the top right hand corner. These will be updated automatically when you amend the details of the project.

Once a project is completed you can access the “view results” page to gain a more detailed breakdown of the results and also generate output documents from your information.

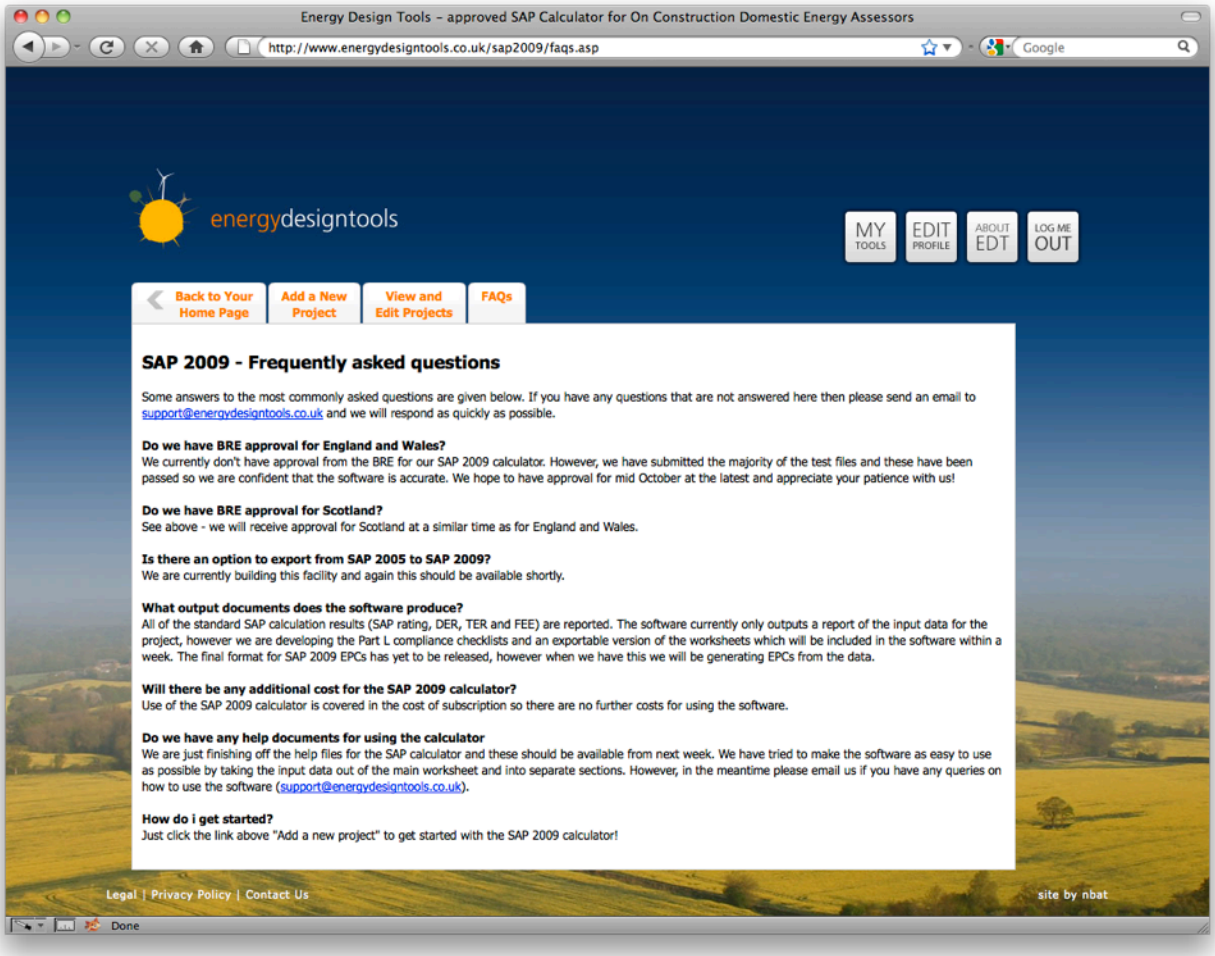
Yellow/red questions marks are included next to most data input items – they are here to provide helpful tips on the information that is being requested. Additionally, if on the submission of a page, there is a problem with any of the data, the yellow question mark will turn red, highlighting where the problem is.

Fractions/percentages are often requested throughout the calculator. When a fraction is requested, you should enter a value of between 0 and 1. Where a percentage is requested, please enter a value of between 0 and 100.

SAP 2009 Main menu

You can navigate through the main menu by clicking the tabs. The menu items available are:

1. Back to your home page
2. Add a new project
3. View and edit projects
4. FAQs
5. Groups
6. User Guide



1. Back to your home page

Clicking this link will take you back to the main page with links to all of your calculators.

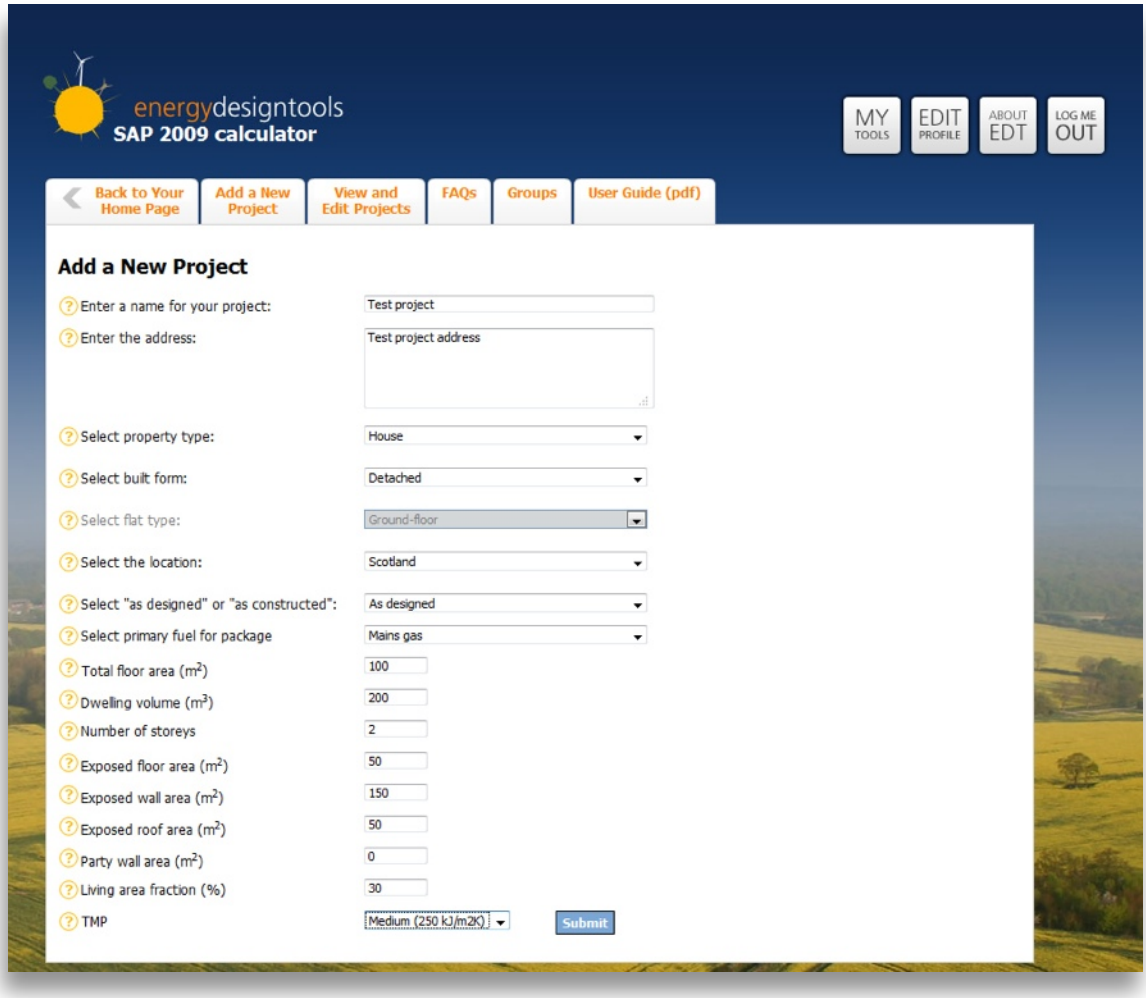
2. Add a new project

Click this link to create a new project.

You must enter a name and address for your project, and also select the built form, detachment and if applicable the flat type. The region selection is important as it determines the regulations that your project will be calculated against and also the output documents that you can produce.

If England/Wales is selected you must also choose whether the information is the project “as designed” or “as built”.

For Scottish regulations you have the option of entering the information using the Scottish "package approach" by selecting the fuel for the primary heating system. This generates the project automatically with specifications according to those given in the Technical Handbook for the primary fuel selected. If you want to enter your project in this way then you must also enter details for the total floor area, volume, number of storeys, exposed wall, floor and roof areas, party wall area, living area fraction and finally the TMP. If you select this option you will generate a project where the DER and TER are equal since they are both calculated using the same specification. You are able to use this as a starting point for creating a project and you can amend any of the details if required.



Screen shows typical data entry for a Scottish project generated to meet the standards of the gas package (specifications are as detailed in the technical handbook)

Alternatively, you can create a blank Scottish project if you select "No package selected". In this case you do not need to complete any further details as these will be entered as you progress through the project.

Once you have entered the details, click "submit" to enter the information. If there are any problems with any of the selections then you will be alerted where the problems are. Otherwise, you will be redirected to the main calculation area (see section SAP 2009 Project menu for details on this)

3. View and edit projects

This page lists all of the projects that you have created in the calculator, by default listed in descending date order (newest project first). This list can be ordered alphabetically by clicking on the “project name” link.

A drop down box alongside the project gives you the actions that are available for each project. To complete the action, select the appropriate choice and click the “Go” button next to it. The actions are as follows:

Edit/view projects

Select this option to open the project for viewing, editing or generating results and output documents. You will automatically be redirected to the main calculation area with the details of the project loaded.

Save project as

This will open a small window in which you can enter a new name to identify the new project. On submission a link will appear to allow you to close the window, and this will also refresh your list of projects to include the newly generated project. While this should generate a copy of your project, we do recommend that you take a look through this to ensure that the data is as expected.

Delete project

Select this option if you wish to remove this project entirely from your list. Use this option with caution – once a project has been deleted it cannot be retrieved!

4. FAQs

These are displayed when you access the SAP 2009 calculator, and we will update with news updates or any recurring questions that we receive.

5. Groups

This option allows users with a group subscription to share their projects amongst other members of their group, making them available for saving into your project folder or to view. This section will only be active if you hold a multi-user subscription.

6. User guide

Click this link to access this help file.

SAP 2009 calculation menu

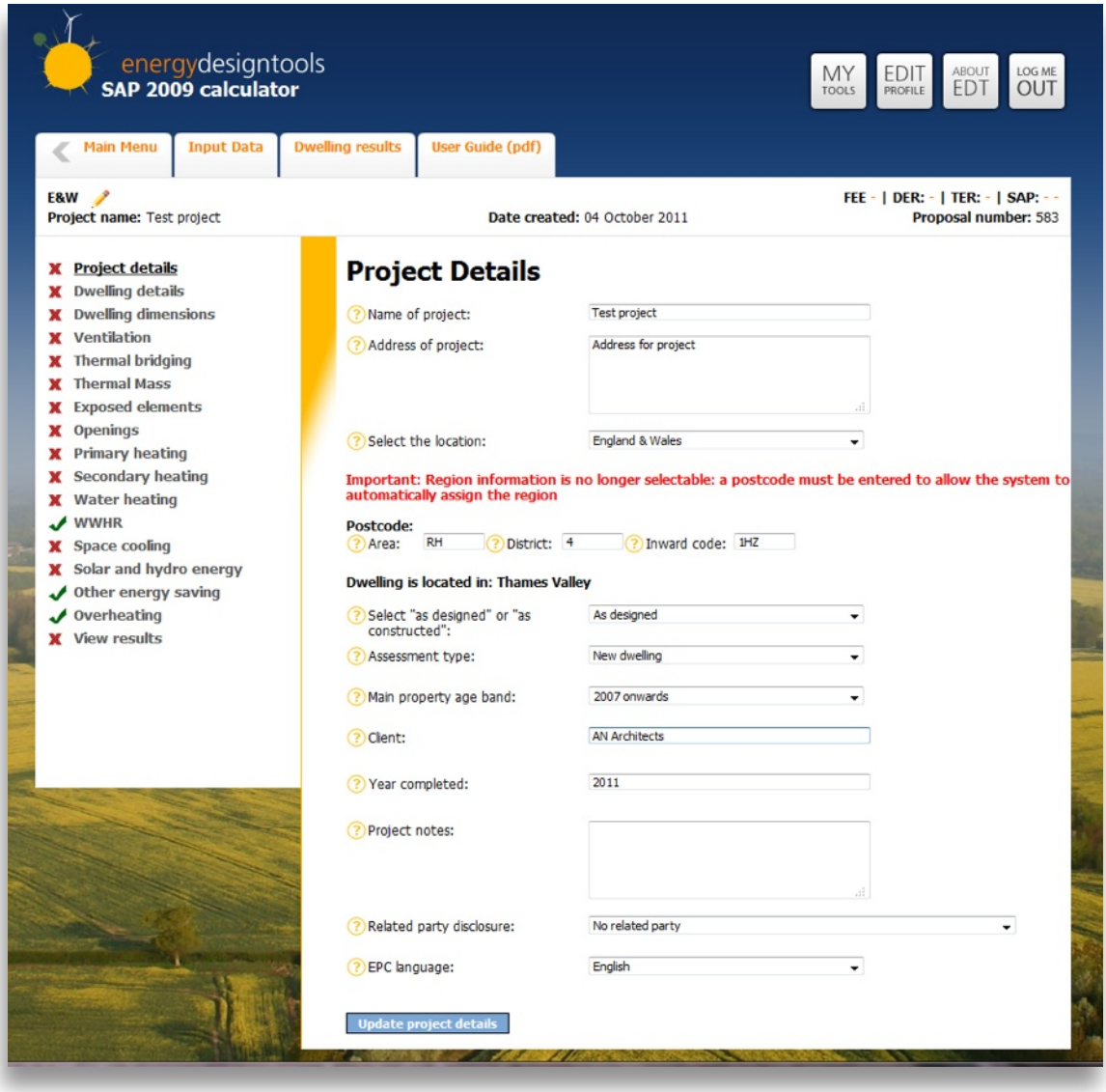
This area contains a series of links to pages to enter all of the information you need to complete a project. The sections that must be completed are as follows:

1. Project details
2. Dwelling details
3. Dwelling dimensions
4. Ventilation
5. Thermal bridging
6. Thermal mass
7. Exposed elements
8. Openings
9. Primary heating
10. Secondary heating
11. Water heating
12. WWHR (Waste water heat recovery)
13. Space cooling
14. Solar and hydro energy
15. Other energy saving technologies
16. View results (also accessible by clicking the “Dwelling results” page on the top tab.)

Unless you are editing a previously created project or have just created a project using the package approach, the majority of the menu items will have a red cross next to them, denoting that they have not been completed. Once all of the sections have been completed, the FEE, SAP, DER and TER for the project will be calculated and displayed in the top right hand side of the screen. The project name, date created and proposal number will always be displayed and it is useful when you contact us with a problem if you can provide us with these details. The first page that you are directed to is the Project details page.

1. Project Details

In this page you can edit the name, address, location, and designed/constructed status of the project.



Screen shows completed project details form. Postcode lookup denotes that this dwelling is located in the Thames valley.

The post code must also be specified and it is important to get this accurate as this will now be used to determine the dwelling region, the selection of which will in turn affect the calculation of the Fabric Energy Efficiency and cooling calculations (if your dwelling has fixed air conditioning), both of which require regional weather data for its calculation.

Once you have completed the postcode “Area” and “District” fields a message will be shown confirming the region that your dwelling is located in. The inward code should be completed but will not impact upon the region so can be left blank initially. This lookup is compared against information from the BRE and if you notice any problems with this selection then let us know and we will inform the BRE of any issues.

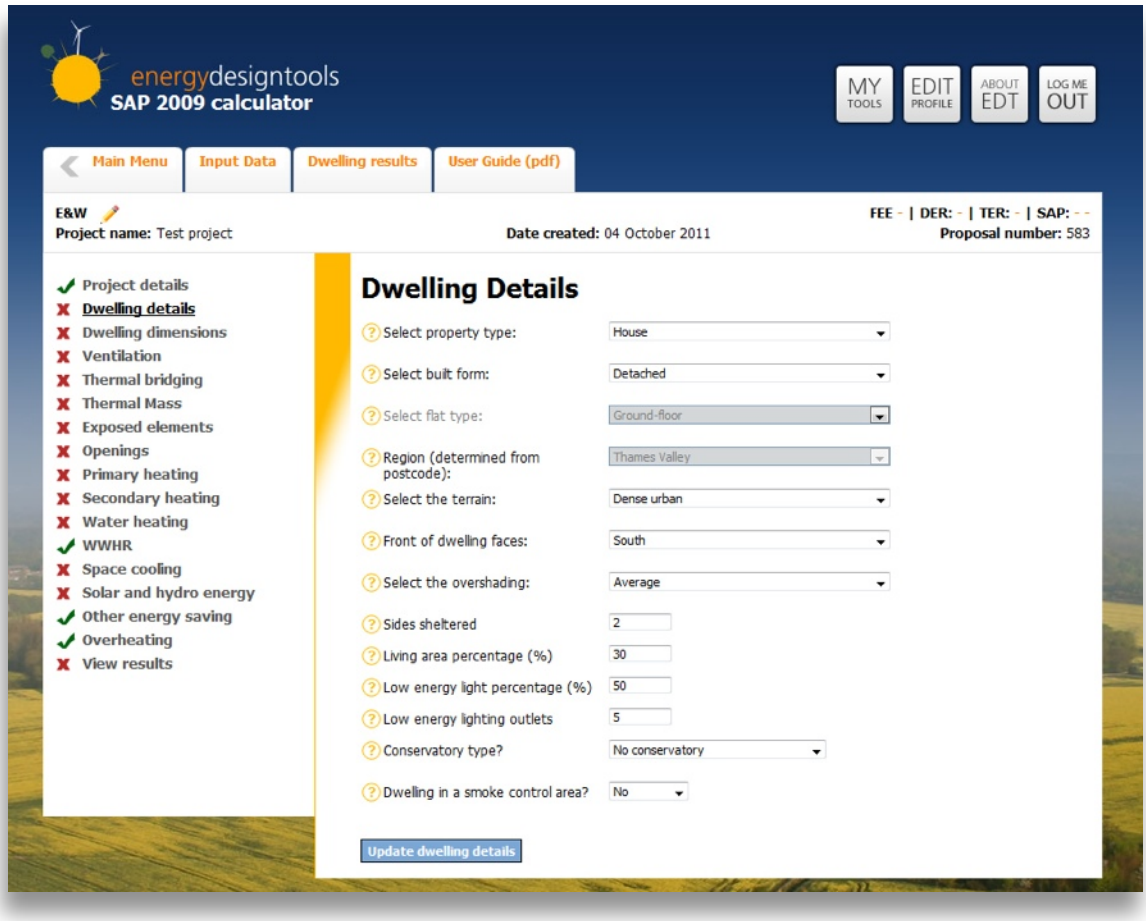
Additional information which is displayed on Energy Performance Certificates, such as “Year of completion”, “Client” and “Related Party Disclosure” are also editable. If you are generating the

project according to England and Wales regulations then you must also select the language to be used when generating the EPC (English or Welsh).

Click the “Update project details” button to save your information and progress to the Dwelling Details page. You will notice that the red cross against the Project Details menu link has now changed to a green tick, denoting that it has been completed.

2. Dwelling Details

This page allows you to amend some of the details of the dwelling. The property type, built form and flat type will be set to those entered initially but can be changed here.



Screen shows typical entry for the dwelling details page.

The region selected in the previous page will be displayed.

The terrain type is listed and will affect the energy generated by any Micro Wind Turbines that are part of the dwelling. A rural terrain will improve the performance of a wind turbine.

Front of dwelling and overshading information is used in the calculation of summer overheating. If these are not known you can select unknown, however bear in mind that for the overheating calculation, the worst case orientation is assumed.

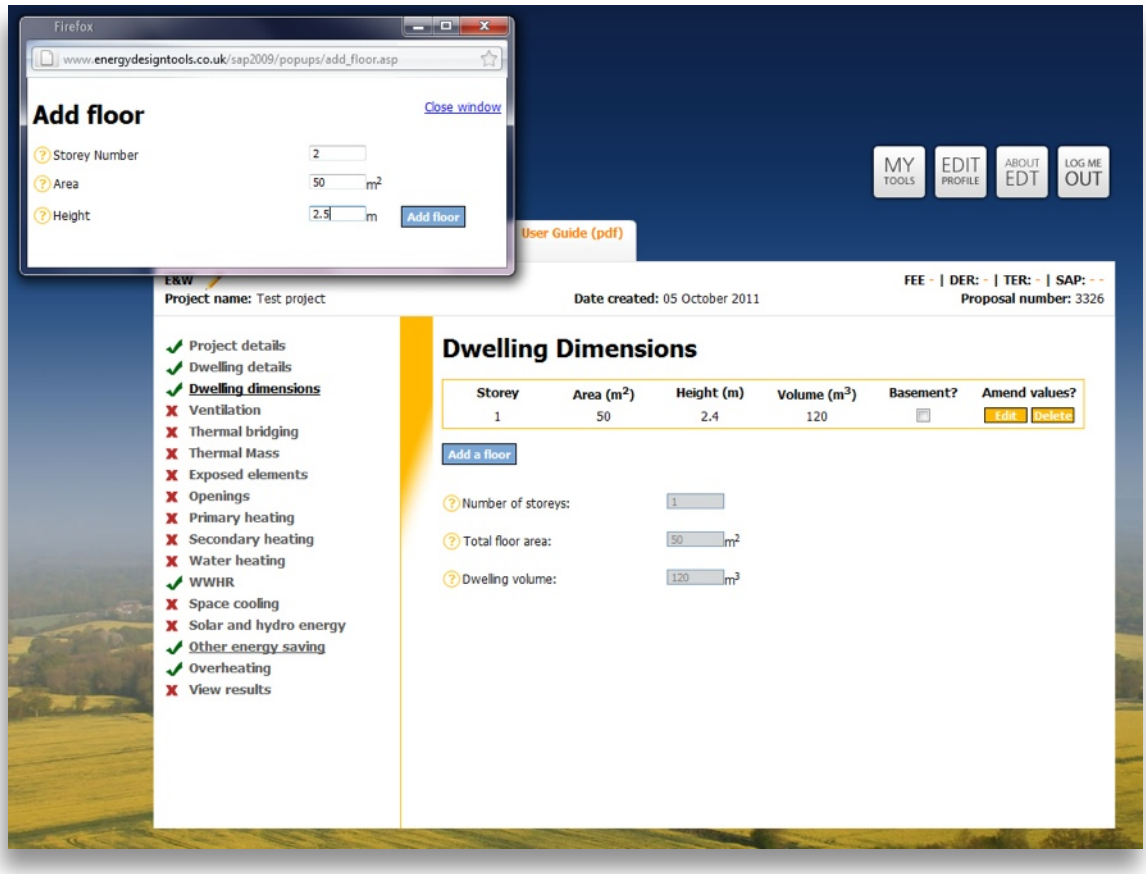
Sides sheltered should be entered as 2 if unknown, and you must also enter the living area percentage, low energy light percentage and number of low energy outlets. Conservatory type and smoke control information should also be entered. Definitions for each of these items are explained clearly in the SAP documentation, so you are encouraged to read this if you are unsure.

On completion of the information, click “Update dwelling details” to progress to the Dwelling dimensions section of the calculator.

3. Dwelling Dimensions

This section allows you to enter the dimensions of the floors of the dwelling. Initially, this screen will be blank, with the total floor area and dwelling volume calculated at 0. Click the “Add a floor” button to open a new window to add a floor.

Entering the lowest storey first, build up the floors of the dwelling. The “storey number” field is given as a reference but it is recommended that you start with 1 (or 0 in the case of a basement floor) and progress upwards. Click the “Add floor” button to save the details and once this page has refreshed click “Close window to update dwelling information”. This will close this screen and refresh the main calculation page to display the newly added floor and updated total floor and volume areas.



Screen shows addition of a second floor to the project.

If one of the entered floors is a basement floor, you can denote this by checking the “basement” checkbox in the table (just click again to remove this). Only one floor can be marked as a basement.

Alongside the floor details, actions will also be available to allow you to edit this information (a new window will open for you to change this) or delete the floor altogether. After each action has been completed, the screen will refresh to display the current floor information and total floor area and dwelling volume totals.

As soon as you have added at least one floor the Dwelling dimensions section will be marked as complete.

There is no “submit” button to progress to the next page – just keep adding as many floors as required. When you have finished, click “Ventilation” on the left hand menu to progress to the next section.

4. Ventilation

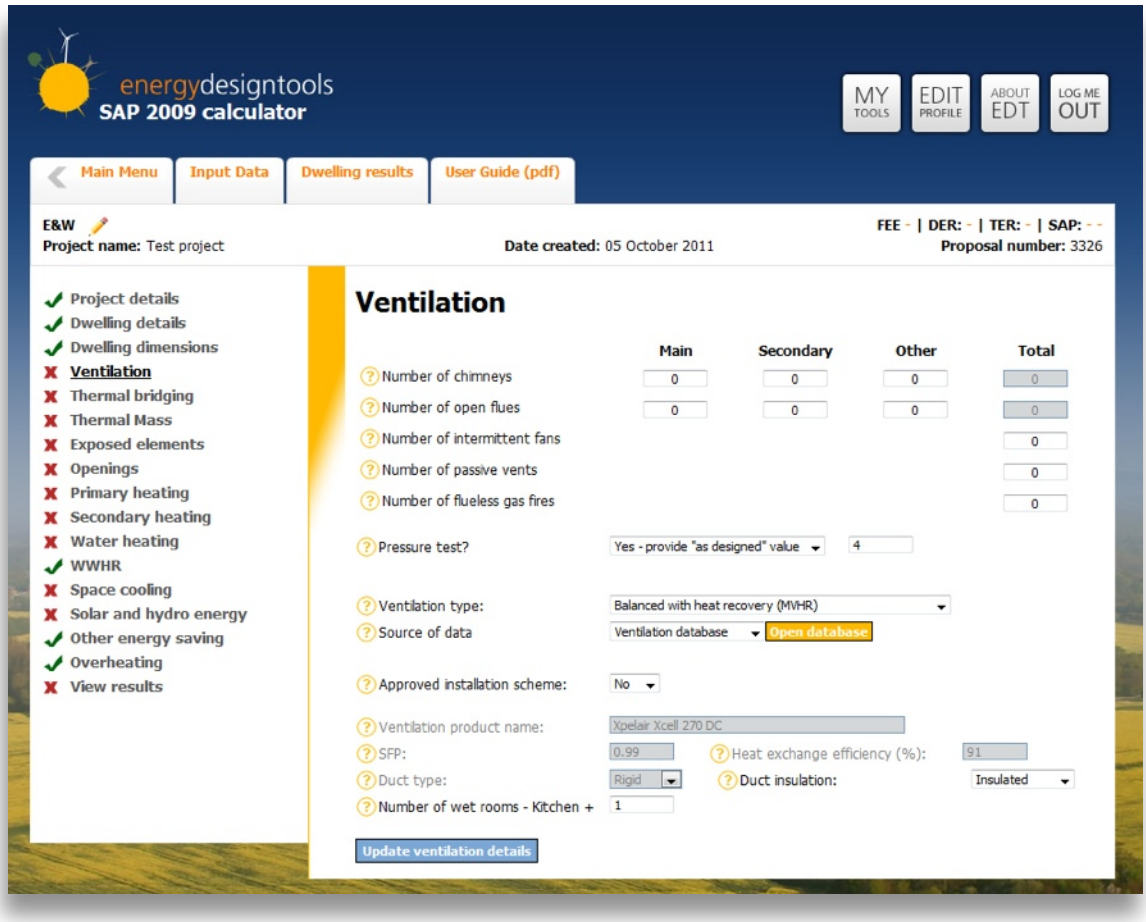
This section allows you to enter all of the information to calculate the air change rate of the dwelling.

Enter the number of chimneys, flues, intermittent fans, passive stack vents and flueless gas fires into the appropriate boxes. Please note that when you select a primary or secondary heating system with an open flue or chimney this information will be automatically updated. Additionally, if you specify mechanical ventilation with heat recovery (MVHR) the number of intermittent fans will automatically be set to 0.

Pressure testing

Different options are available when entering a pressure test result and these depend upon the country, and whether it is for an existing dwelling, a dwelling as designed or a dwelling as built:

1. (E&W, S) Existing dwellings – select the option: “**No, calculate air permeability**”. The input fields for the permeability calculation will be displayed for you to complete and you will not need to carry out or enter an air pressure test.
2. (E&W, S) For new build dwellings, both as designed and as constructed you can **assume the value of the pressure test** (at a value of 15 for England and Wales, 10 for Scotland). Remember that in doing this you will probably need to make improvements elsewhere to meet the Target Emission Rate.
3. (E&W, S) for dwellings as built you can select “**Yes – provide as tested value**” and enter the value from the pressure test. In England and Wales, you must also select whether the pressure test has been carried out on the dwelling you are designing, or for a similar dwelling. If it has not been carried out for the dwelling you will be penalised for this and the air permeability value increased in the calculations by 2.
4. (E&W, S) for dwellings as designed select “**Yes – provide as designed value**” and enter the design pressure test result.



Screen shows ventilation section completed and specifying an MVHR system.

The type of ventilation must next be selected. It is best to refer to the SAP document for full information on each of these, however if you select:

- Positive input from outside
- Mechanical extract, centralised (MEV c)
- Mechanical extract, decentralised (MEV dc)
- Balanced without heat recovery (MV)
- Balanced with heat recovery (MVHR)

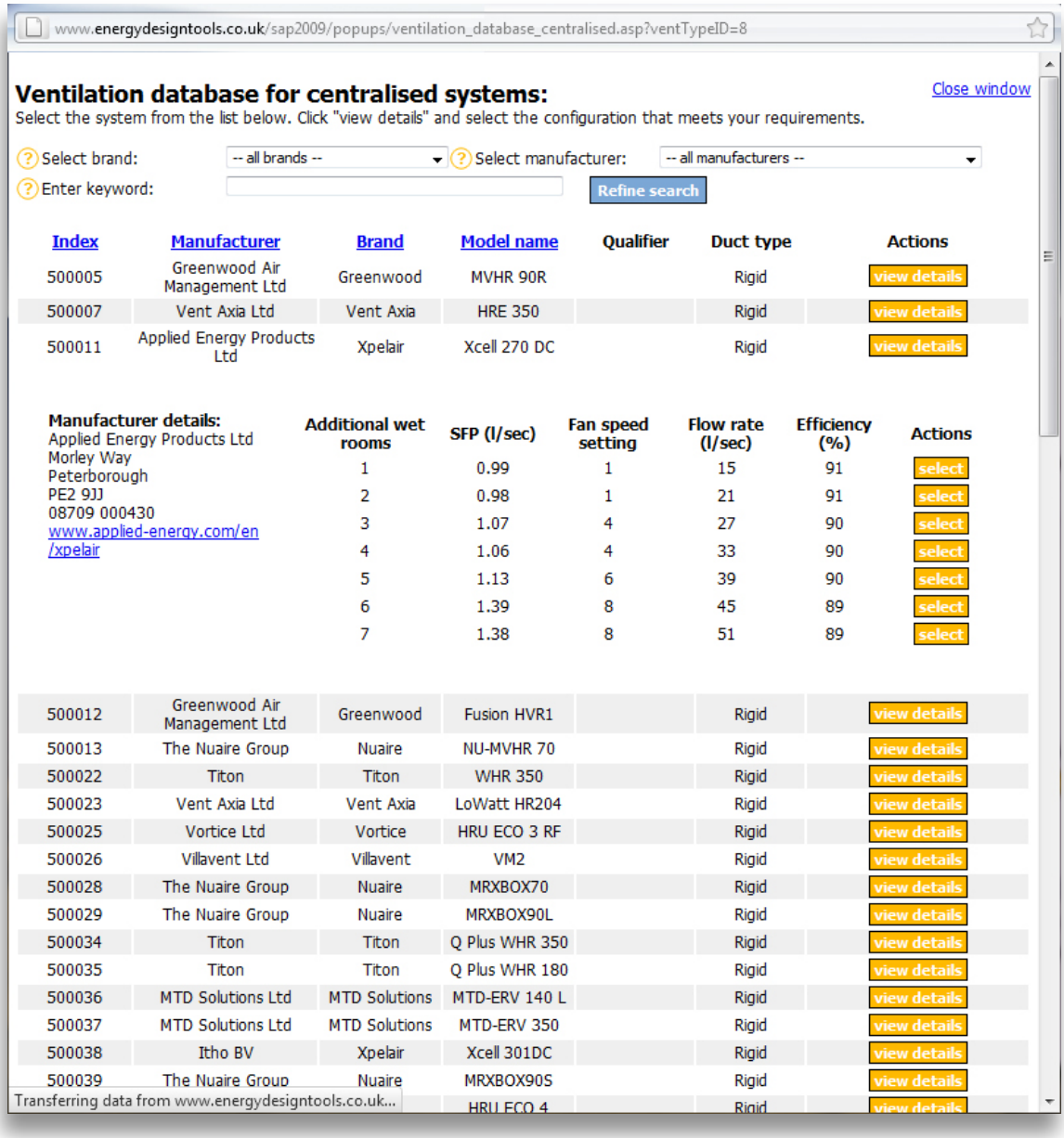
you will need to enter additional information about the ventilation system selected, starting with the data source (Product Database, Manufacturer's data or SAP tables) for the information. The requirements for each data source are as follows:

<u>Product database</u>
This is the preferred source of information for calculations. Click the "Open database" button that appears when this option is selected, and choose your system from the list.

In the case of centralised systems, you must select the configuration which corresponds to the number of wet rooms in the project (click "View details" to view the options and then "select" against the correct configuration.

In the case of decentralised systems, simply click "select details" and the SFP for each configuration will be entered into the main ventilation page. You will have to enter the number of fans for each

configuration manually before submitting the page. In each case, a screen will display alerting you that your system has been selected and to close the database page and complete the information.



Screen shows ventilation database for centralised systems with details of the Xpelair Xcell DC270 model displayed.

If you use the ventilation database you should not have to select duct type as these will be specified within the database record.

Manufacturer's data / Appendix Q datasheet

This is the next best option for entering data. Use this if you have information from either of the above data sources. In all cases, enter the SFP, duct type and number of wet rooms. For systems with heat recovery, also enter the exchange efficiency and select whether there is duct insulation. For decentralised systems you must enter the SFP and number of fans for each configuration.

SAP default values

Click this option if you wish to specify a system using the default values given in the SAP tables. If you choose a decentralised system you will have to enter the number of fans for each configuration. Up to date information on the default data specified when you select from the SAP

tables is available in the SAP documentation, however entering a system using the SAP default figures will most likely result in a worse-performing system than one entered using the ventilation database or manufacturer's details.

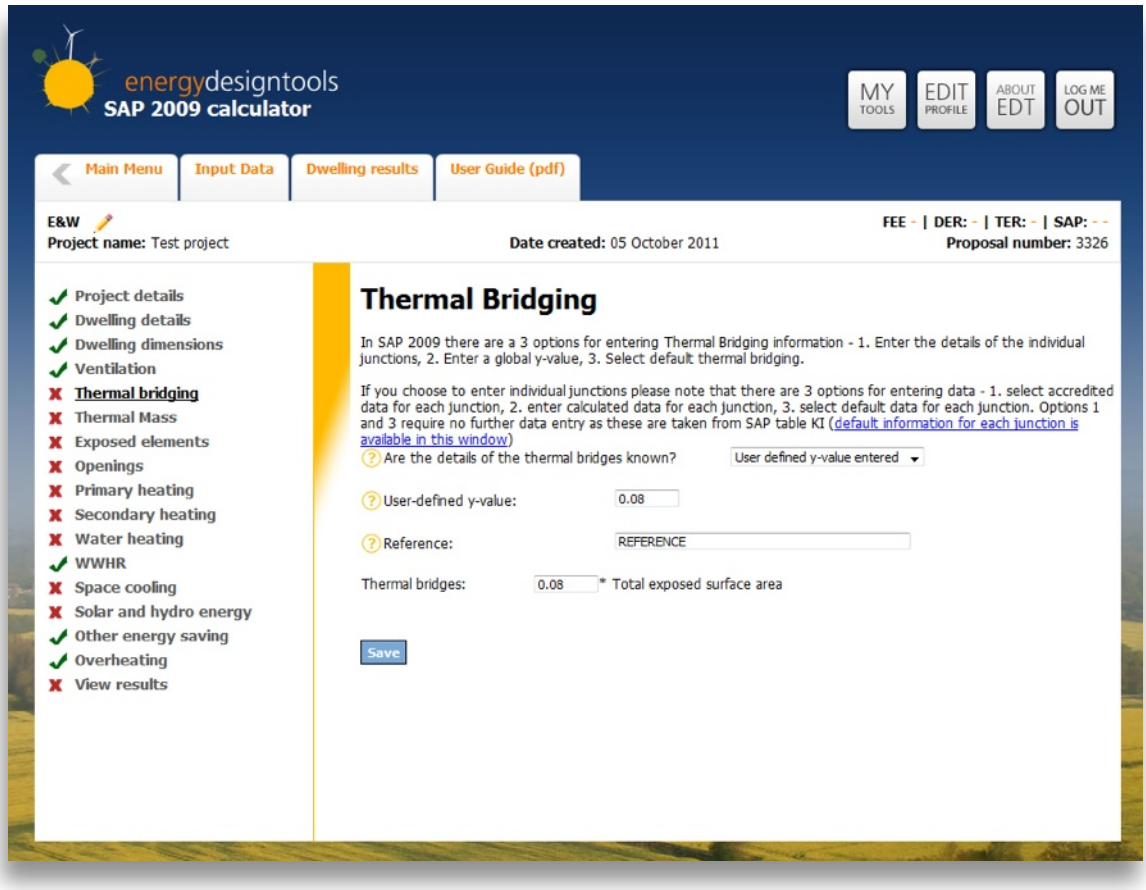
The selection "Approved installation scheme" is included as per current requirements, however, since there is no such scheme currently, select No. In the future it is planned to implement such a scheme which would offer improved performance against a non-approved ventilation installation.

Once you have entered the details, click "Update ventilation details" to progress to the next section, Thermal Bridging.

5. Thermal Bridging

This section allows you to enter the thermal bridging details of the dwelling. There are currently three options:

1. Enter the details of each junction if known
2. Enter a global user defined value (reference required)
3. Assume a value of 0.15 if neither of the above is known (similarly to selecting a default pressure test, choosing this option will also penalise you and you will need to make improvements elsewhere to meet the TER).



Screenshot displays entry of a global y-value of 0.08

Option 1 is the initial option, and the screen will show a list of all of the junctions in SAP. You must check the box against each of the junctions that applies, select the data source and enter the length. If you select the data source as "Accredited" or "Default" then the phi value will be entered automatically according to the SAP specification. If you enter a "calculated" junction then you must enter this detail yourself. A running total of the length of the junctions and the calculated thermal bridges value is displayed at the bottom of the page for reference.

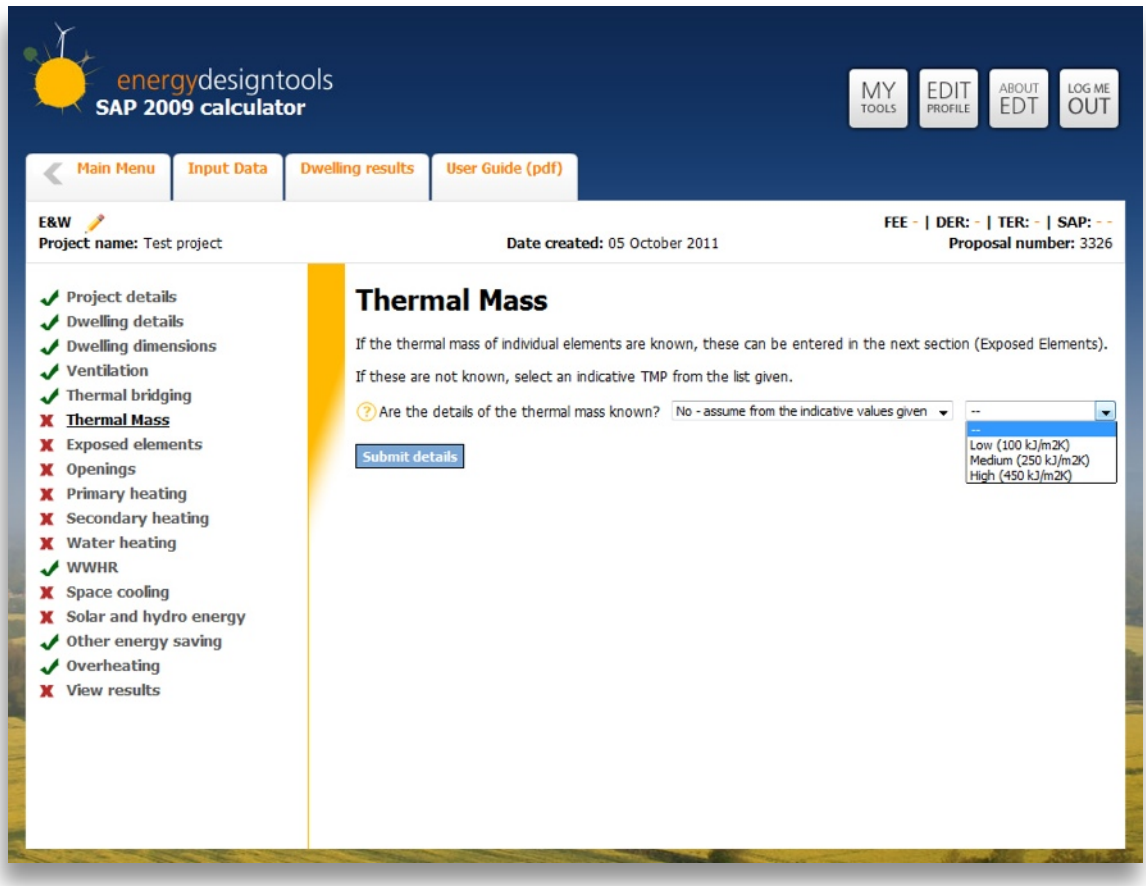
If option 2 is chosen, the screen will change to allow you to enter the global value and the reference for this.

In the case of option 3, no more information is required, however please note that this is a poor value compared to the notional dwelling and you may find it hard to meet regulations with this selected.

Click “Save” to save the details and proceed to the next stage: “Thermal mass”.

6. Thermal Mass

There are two options for completing thermal mass – either as a global value for the dwelling (low, medium or high), or against individual elements that are specified in the exposed elements section (the next section). If you don’t have the individual details select “**No, assume from the indicative values given**” and choose from the drop down menu. Alternatively select “**Yes, enter details in the next page**” and click “Submit details” to proceed to the Exposed elements section.

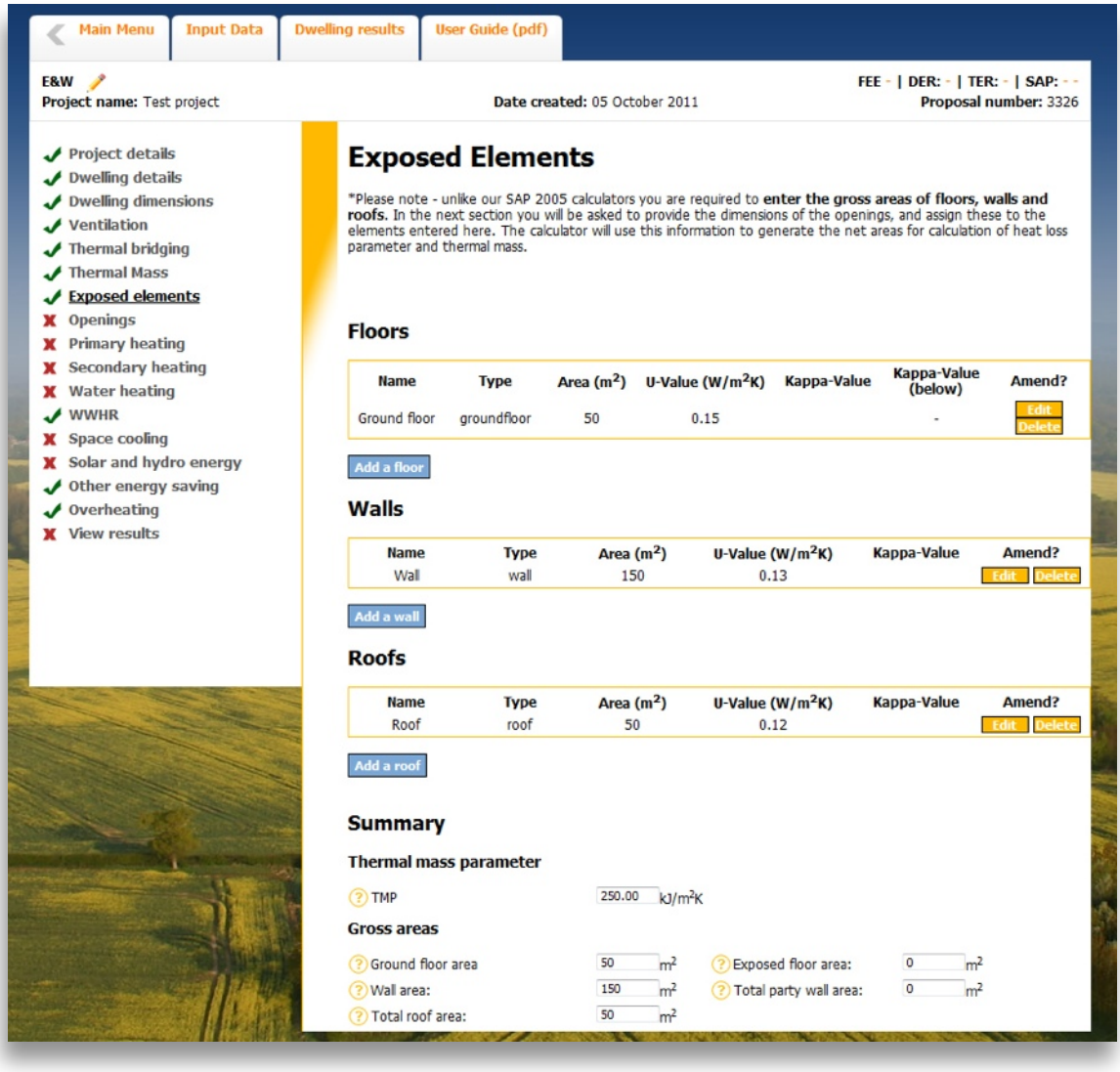


Screen shows options of selecting low, medium or high values of TMP.

7. Exposed Elements

This section allows you to enter the information about the floor, wall and roof elements of the dwelling, their areas, types and also U and kappa-values where applicable. Unlike our SAP 2005 calculator you must enter the gross areas of all elements.

The bottom of the screen displays cumulative results for the total areas of each type of element. The elements are separated into three types – floor, wall and roof. Click the appropriate button to add a new element of the type.



Screen shows example of data input for the exposed elements section. No kappa values are required because an assumed TMP was selected in the previous page.

Please note – kappa values are optional depending upon the selection in the Thermal Mass section – if a global value has been applied, these boxes do not need to be completed.

<u>Floor types</u>

There are a number of different floor types. In all cases provide a reference, the area of the floor and also assign this to a storey in the dwelling. The following information should also be supplied for each of the types:

- Ground floor – supply U-value and kappa values
- Internal walls – supply kappa values (set U-value to 0)
- Basement floor - supply U-value and kappa values

- Exposed floor - supply U-value and kappa values
- Party floor - supply U-value and kappa values

Wall types

There are a number of different wall types. In all cases provide a reference and the area of the wall. The following information should also be supplied for each of the types:

- Exposed wall - supply U-value and kappa values
- Sheltered wall - supply kappa values (set U-value to 0)
- Party wall - supply U-value and kappa values
- Internal wall - supply kappa values (set U-value to 0)
- Basement wall - supply U-value and kappa values
- Curtain wall - supply U-value and kappa values

Roof types

There are a number of different roof types. In all cases provide a name and the area of the roof. The following information should also be supplied for each of the types:

- Exposed roof - supply U-value and kappa values
- Party ceiling - supply U-value and kappa values

You can enter as many floor, roof and wall types as required. After each addition, the main screen will update to include the added element. You can edit or delete each of the added elements by clicking on the appropriate button to the right of their listing.

There is no “Submit” button on this page, and so once you have completed this section, click the “Openings” link on the left hand menu.

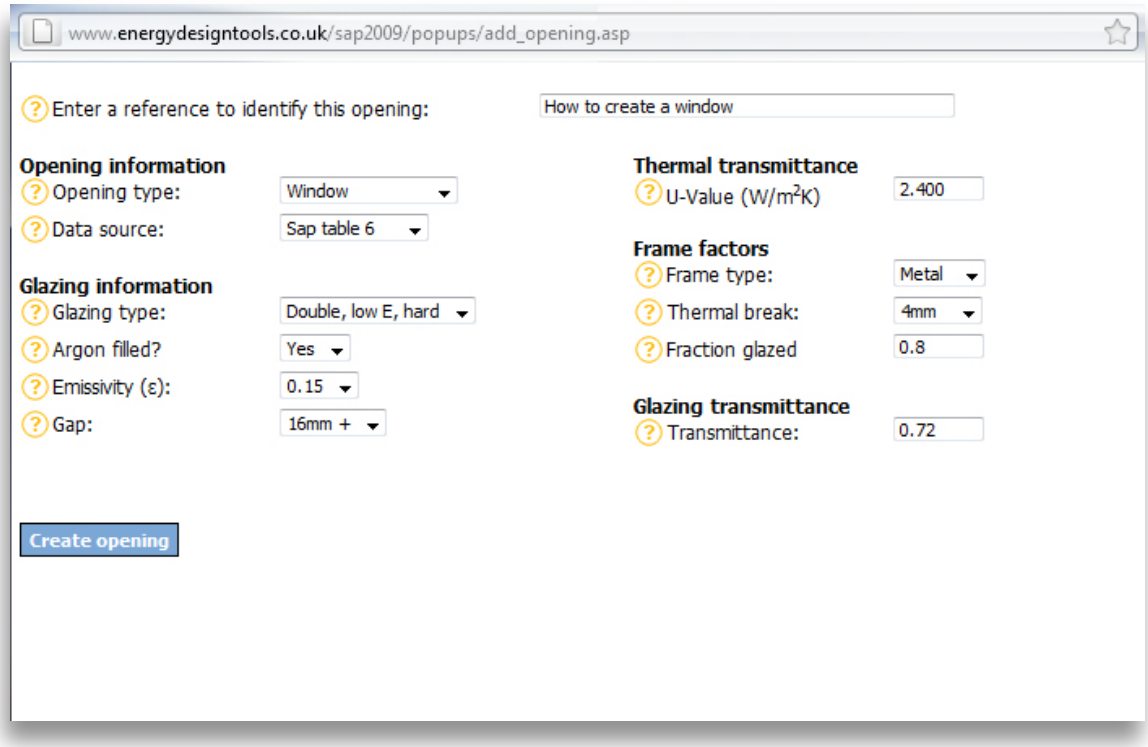
8. Openings

This page is made up of two parts. The top half of the page shows details of all of the openings (windows, roofwindows and doors) in your personal database. This is comprised of any openings that you have added in the past.

The first option on the page is to "Create a new opening". Click this button will open a new popup window to allow you to create a new opening that can be used across all your projects.

Create a new opening

In all cases, enter a unique reference for your opening – this will allow you to identify this for future projects.



Screen shows completed details of a window entered using SAP data source options.

Select the opening type and data source for the opening from the drop down boxes. These options will determine the amount of information that you will need to enter.

Solid door:

Select the data source. If this is from Manufacturer's data enter the U-value for the door (no further information is required).

Glazed door, windows, roof windows:

The data source will determine the information that you need to enter to complete the record:

SAP:

1. Select glazing type. If this is anything other than single glazing then you must also select if the panes are argon filled and the gap between the panes. If you select a low-e glazing option then also select the emissivity from the drop down box.
2. Select frame type. If you select a "Metal" frame then also select the thermal break.

3. Fraction glazed, transmittance and U-value will be automatically calculated from this data by cross referencing against the SAP tables. So just click the “Create opening” button to add to your database.

Manufacturer’s Data

1. Select glazing type. If this is anything other than single glazing then you must also select if the panes are argon filled and the gap between the panes.
2. Select frame type
3. Since this data is not from the SAP tables you must also complete the information for U-value, fraction of frame glazed, and glazing transmittance.
4. Click the “Create opening” button to add to your database.

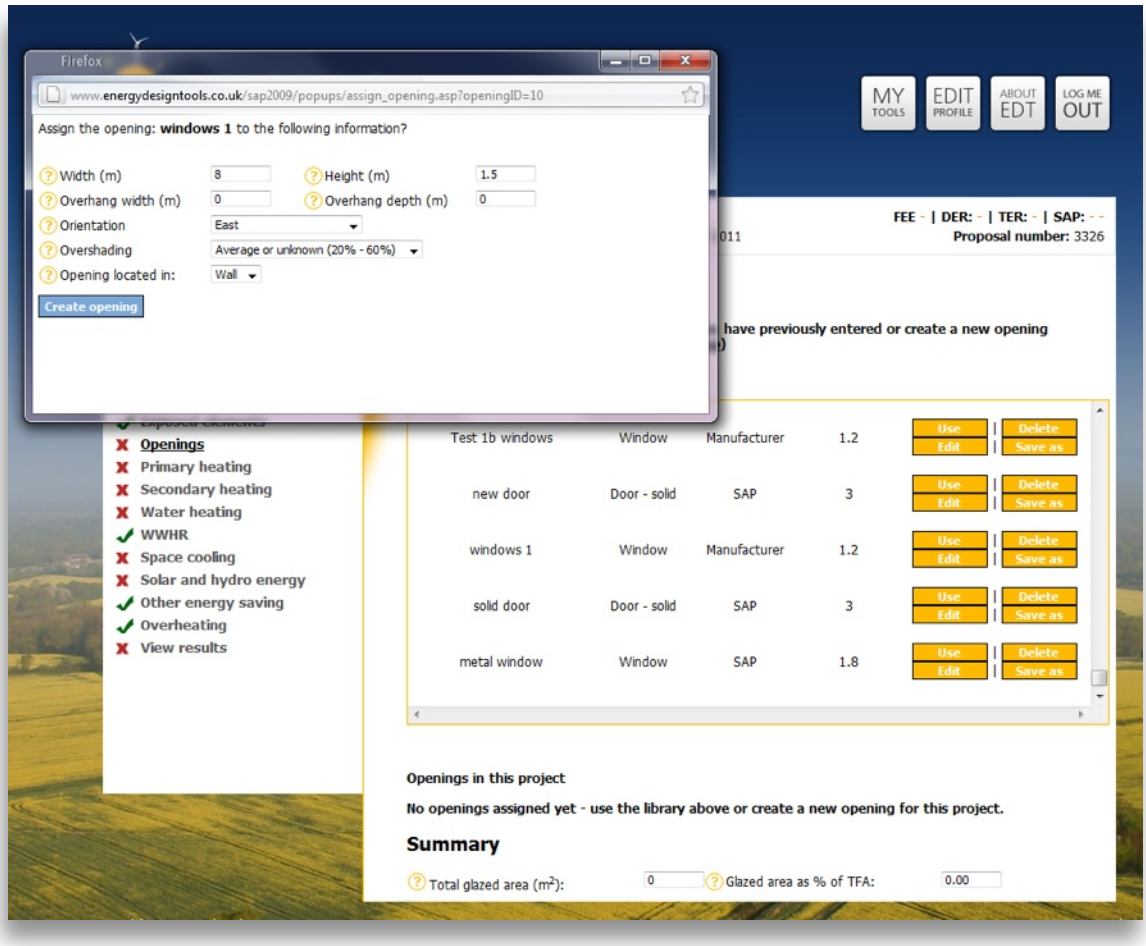
BFRC Data

1. Select glazing type. If this is anything other than single glazing then you must also select if the panes are argon filled.
2. Enter the U-value and the BFRC g-window value. This is a combination of the frame factor and glazing transmittance.
3. Click the “Create opening” button to add to your database.

You can create as many different openings as you wish, and these will be available for you to use on all of your projects (so it is worth making the reference name descriptive). This opening will now appear in your “opening library” with the commands “Use”, “Edit”, “Save as” and “Delete” against it.

Use:

This allows you to use this opening in the project. If this opening is a window or a roofwindow then you must enter the width, height, overhang width, overhang depth, orientation, overshading and the element that it is located in (this will be made up from a list of walls/roofs entered in the exposed elements section). If the opening is a door enter the width, height and select the wall it is located in.



Screenshot shows how a window is assigned to the dwelling.

Edit

This command allows you to change the details of the opening. It will open the “Create opening” dialogue with the details completed. It is important to be careful when using this command since editing will cause this opening to change across all projects that are referencing it. If in doubt we recommend that you use the “Save as” function first to create a copy of the original and then edit this and use this in your latest project.

Delete

User this command to remove the opening from your library altogether. Once again use this command with caution as the opening will be removed from any other projects using this opening.

Save as

Use this command to create a copy of the opening under a new name.

This bottom half of the page displays a list of all of the openings (doors, windows and rooflights) that have been added to the project, plus a summary of the total opening area and % of TFA. The following actions are available against each opening / area combination:

Edit:

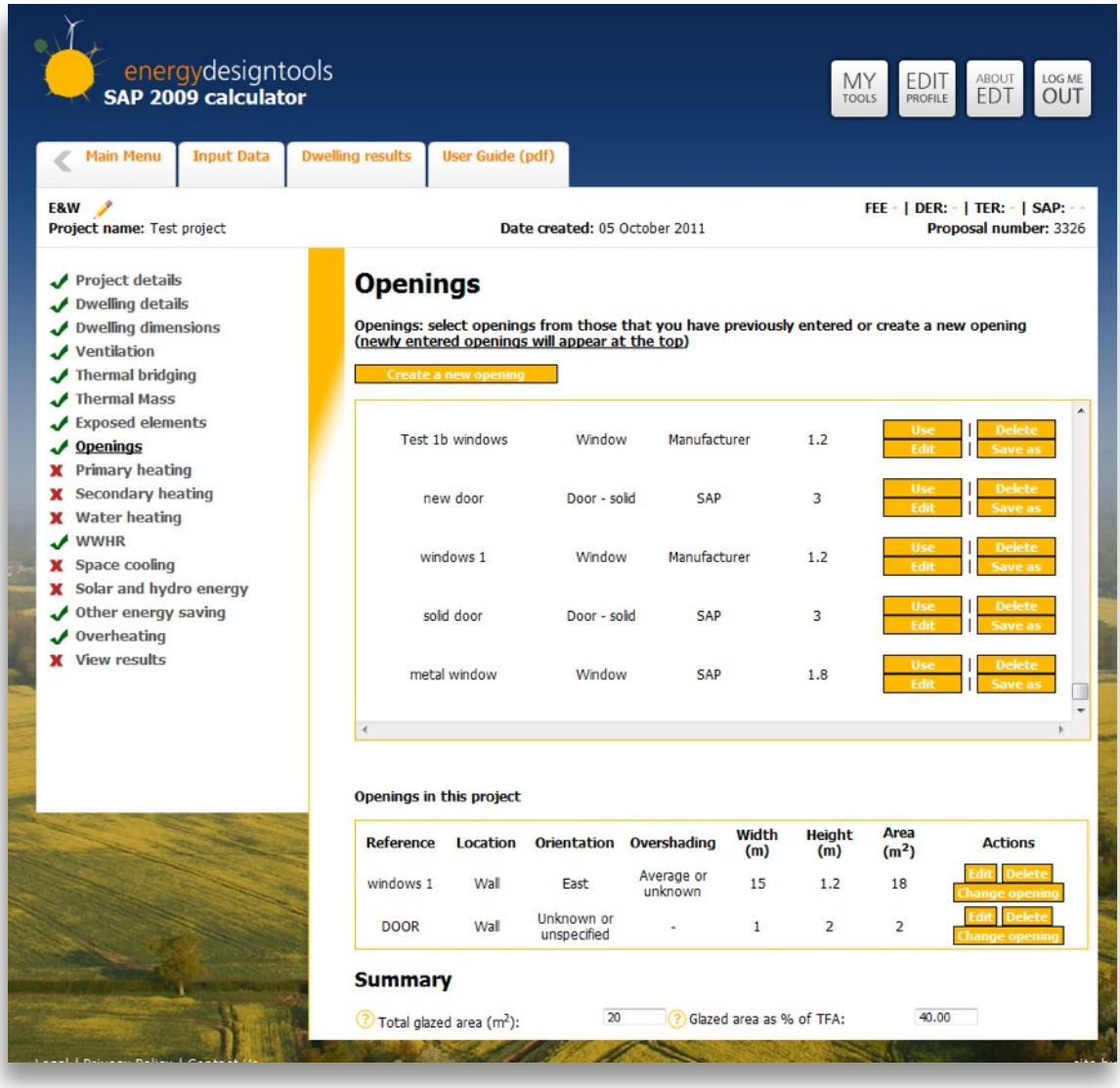
This opens the “Use” interface with the details entered prepolpulated. If this opening is a window or a roofwindow then you can change the width, height, overhang width, overhang depth, orientation, oversha ding and the element that it is located in (this will be made up from a list of

walls/roofs entered in the exposed elements section). If the opening is a door then you can amend the width, height and select the wall it is located in.

Click “edit opening” to save the changes.

Delete
This action deletes this area / opening combination from the project.

Change opening
This command allows you to change the opening that is referenced in this row. A new screen will open with a list of the openings that can be used to replace the original. Select this from the drop down list and click “Update” to change the reference.



Screenshot showing the Openings section with the openings library at the top, and the details of each of the openings that have been added to this project below.

There is no “submit” button to move onto the next section – just click on the “Primary heating” menu item.

9. Primary heating

This section is used to specify the primary heating system(s) and also select the electricity tariff and if applicable emitters used in the dwelling. As specified in SAP, up to 2 primary heating systems can be selected for an individual heating scheme; up to 5 different types of heat sources can be selected for a community heating scheme. Please note- you cannot combine individual and community space heating systems.

The selection of primary heating system can affect the options for emitters and tariff so it is best to select the heating system first – to do this, click "Add heating system". This will open up a new window in which you can complete the details. In a similar way to the "Add opening" page options will become enabled/disabled depending upon earlier choices, so it is best to complete this section in a linear manner.

Individual heating systems:

First select the type of heating system from the dropdown and then select the data source. Different types of system will have different optiosn available for their data source. The three possible options are:

SAP data:

1. Locate the description of the system in the "System" drop down menu

Manufacturer's data:

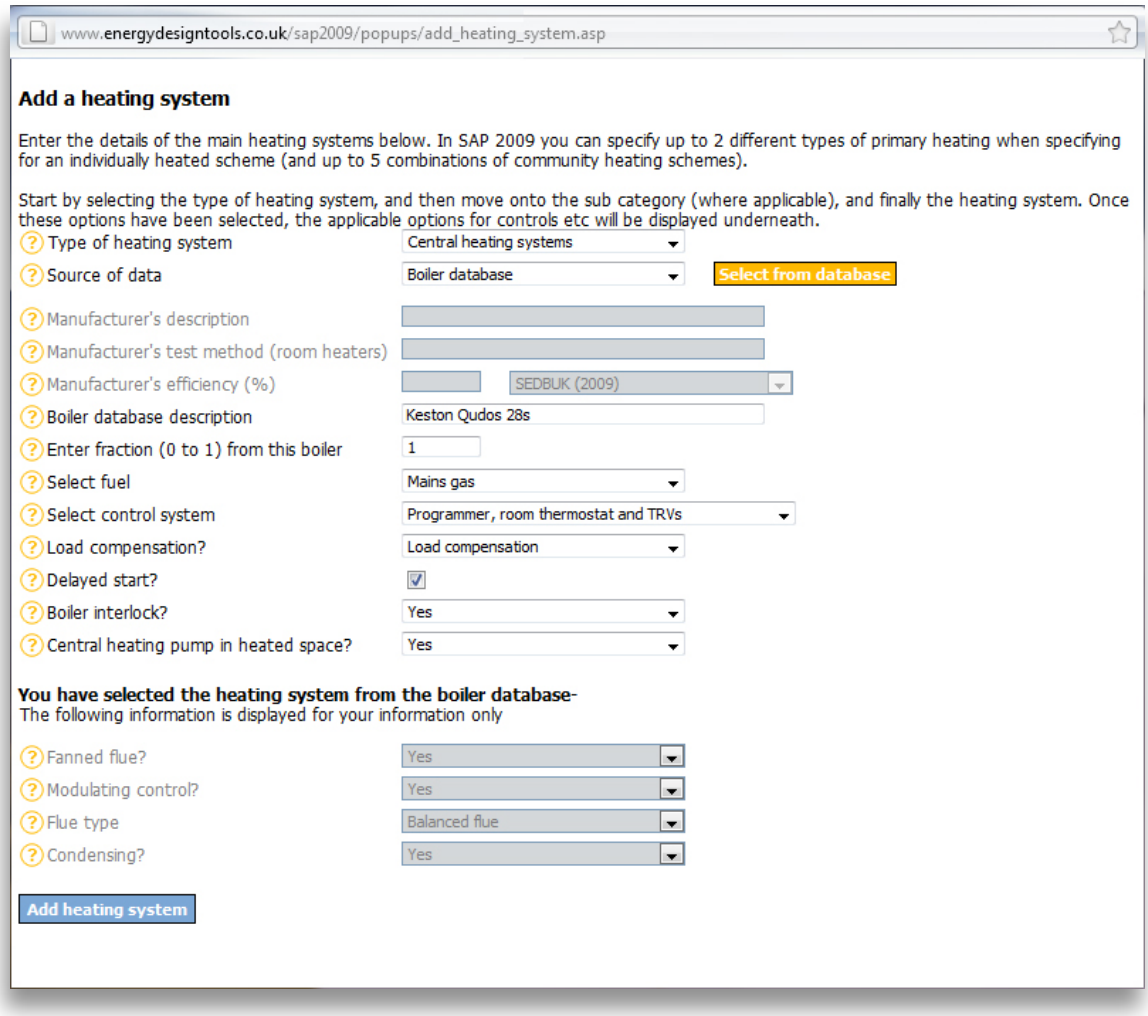
1. Locate the description of the system in the "System" drop down menu
2. Enter the description, test method and efficiency in the relevant fields
3. In the case of a gas or oil boiler with manufacturer's data you must also specify whether the efficiency entered is calculated according to Sedbuk 2005, or Sedbuk 2009.

Boiler database (preferred data source)

1. Click the button "select from database" to open an up to date list of boilers in a new window.
2. Use the refine options / enter a search term to locate your boiler in the database. You can view the more detailed information about the boiler if you click on the "details" button next to the boiler.
3. Click "Select" to choose this boiler and close the window.

In all cases enter the fraction of primary heating that this boiler will provide (greater than 0 and up to 1). Select the primary heating fuel and primary heating controls from the relevant drop down lists.

Depending upon the type of system selected other options will become available, and you must select which of these applies.



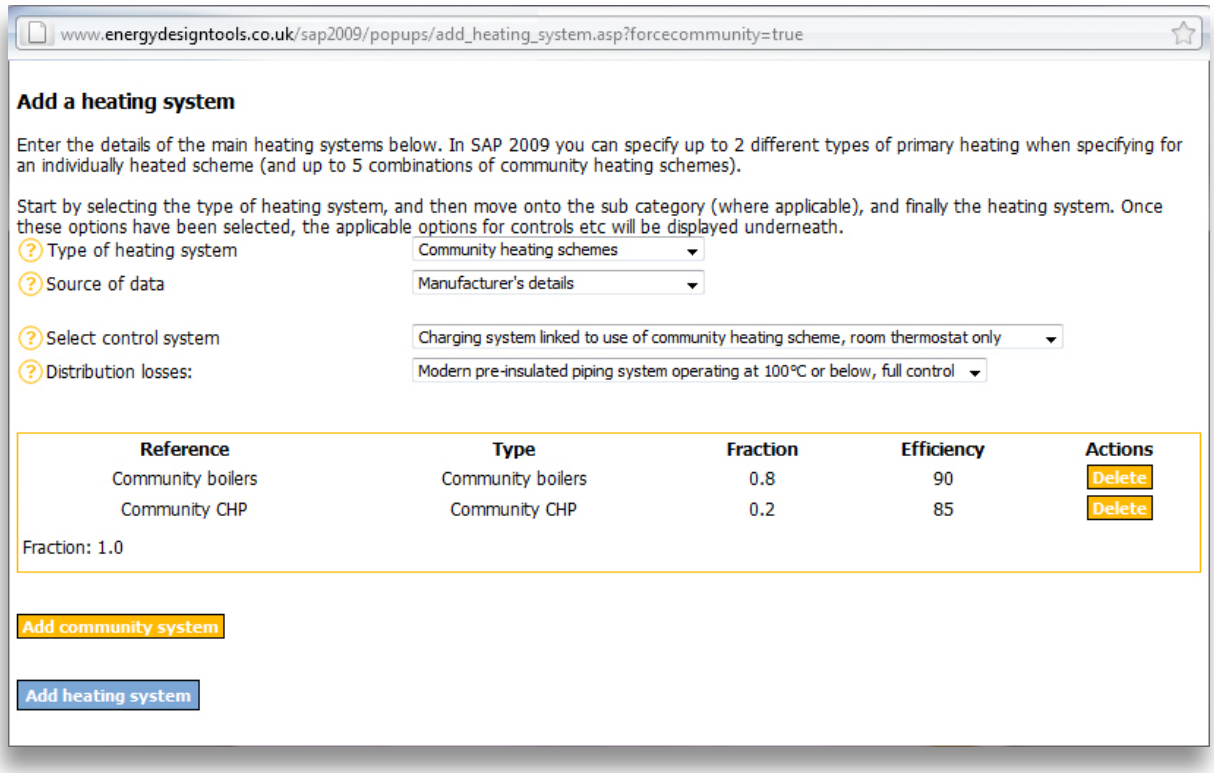
Screen shows typical data entry for a gas boiler selected from the Boiler Database.

Community heating schemes:

The process for specifying a community heating scheme is slightly different – open the "Add heating system" window , and select "community heating schemes" from the type menu. This will refresh the page and display the options that are applicable to community schemes, including the relevant control systems and distribution losses.

A new button should also appear which will allow you to specify the community heat sources. You can specify up to 5 sources, and you must enter the fraction each of these provides, so be careful to ensure that these add up to 1.

Once you have entered these details, select the control system and distribution losses, and click "Add heating system" to update the details.



Screen shows a community heating system served 80% by community boilers running at 90% efficiency; 20% by a community CHP system running at 85% efficiency.

Once the details for the heating systems have been added the main page will update with a summary of the details, and the option to "Edit", "Delete" and in some circumstances "Install FGHR" (see below).

Flue Gas Heat Recovery (FGHR)

If you specify a condensing boiler fuelled by LPG, oil or mains gas you will get the option to install an FGHR device in the dwelling. Click the install FGHR button against the boiler you would like the system installed in and a popup window will open with a list of available systems. Locate the FGHR system and click "Select" to install the system. In some cases FGHR systems are linked to photovoltaic panels and so you must also complete the information required for these. The main page will refresh and the button will change to "Delete FGHR system" click this button if you wish to remove this.

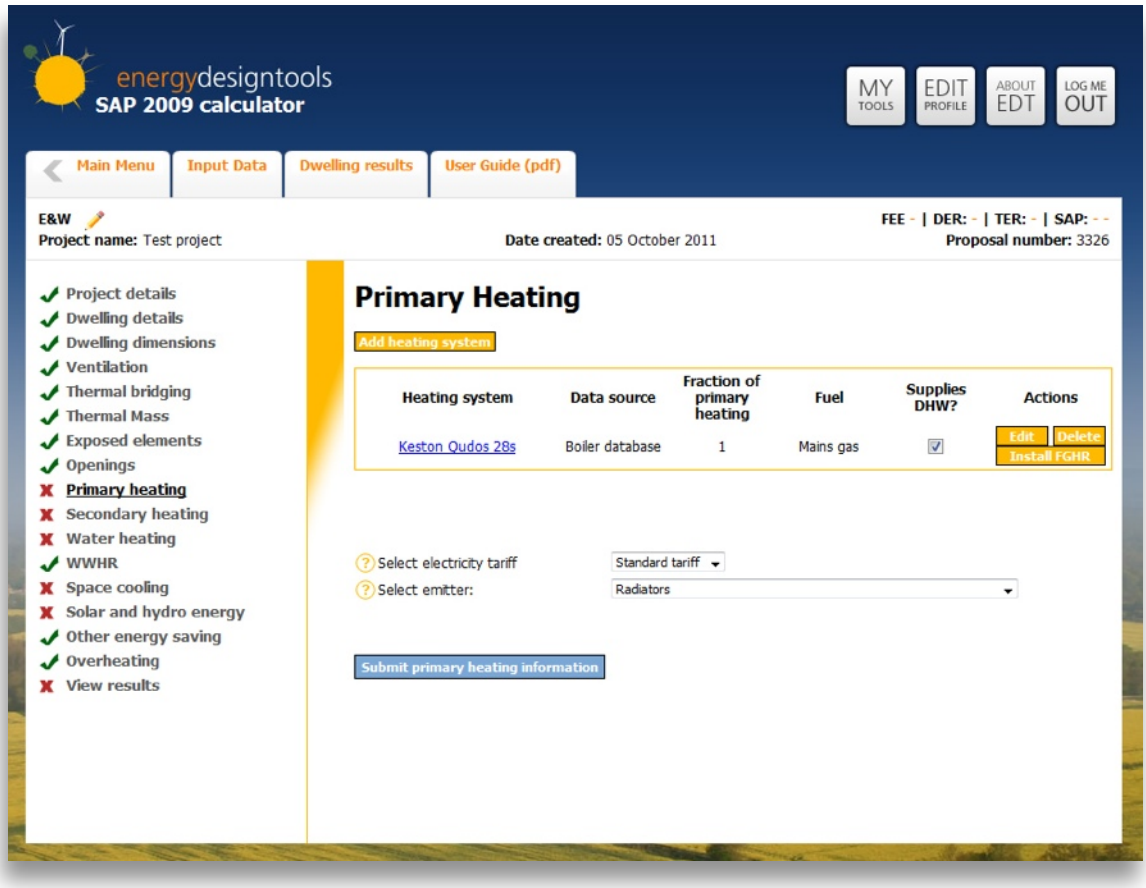
There is a checkbox in the list which will allow you to set if the boiler supplies the domestic hot water.

Emitters

These will be displayed if compatible with the heating system selected (for example, warm air systems do not require emitters). Select the appropriate emitter for your dwelling. Different emitters have different effects on the SAP calculation and it is a good idea to look at the SAP documents for the information on this.

Electricity tariff

In all cases, you must select an electricity tariff. If you have specified an electric heating system, make sure this is compatible for the selection here.

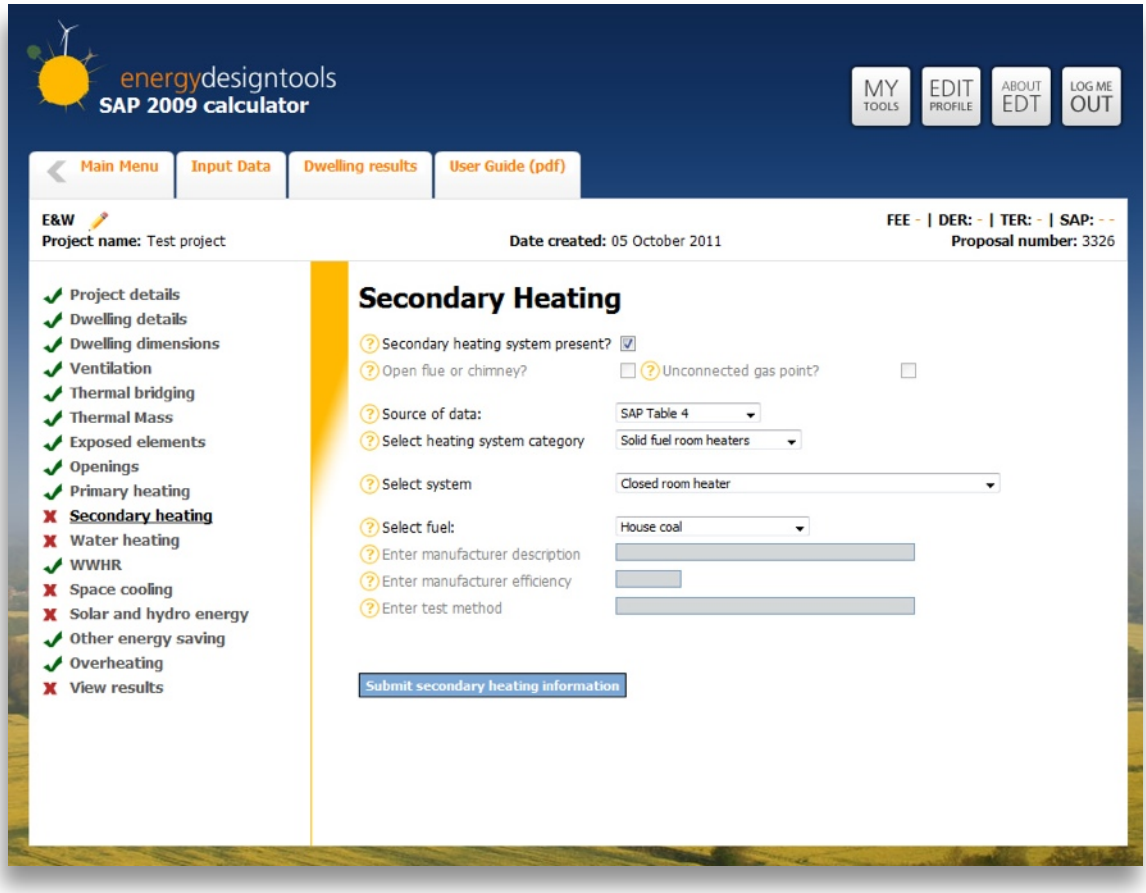


Screen shows selected primary heating system, electricity tariff and emitter.

Click “Submit primary heating” to progress to the next section.

10. Secondary heating

This section allows you to input information about the secondary heating system. You do not need to enter a system if your dwelling has not been designed with one – just leave the box "Secondary heating system present?" unchecked and click "Submit secondary heating system" to proceed.



Screen shows specification of closed room heater fueled by house coal

If there is a system, check the "Secondary heating system present?" checkbox and select the data source (option of SAP or Manufacturer's Data). Select the system from the drop down list and enter the manufacturer's details if applicable. Finally, select the fuel for the secondary heating system

Once you have completed these details, click "Submit secondary heating system information" to progress to the next section.

11. Water heating

This section allows you to specify the system that provides the hot water in the dwelling. There are a few basic options:

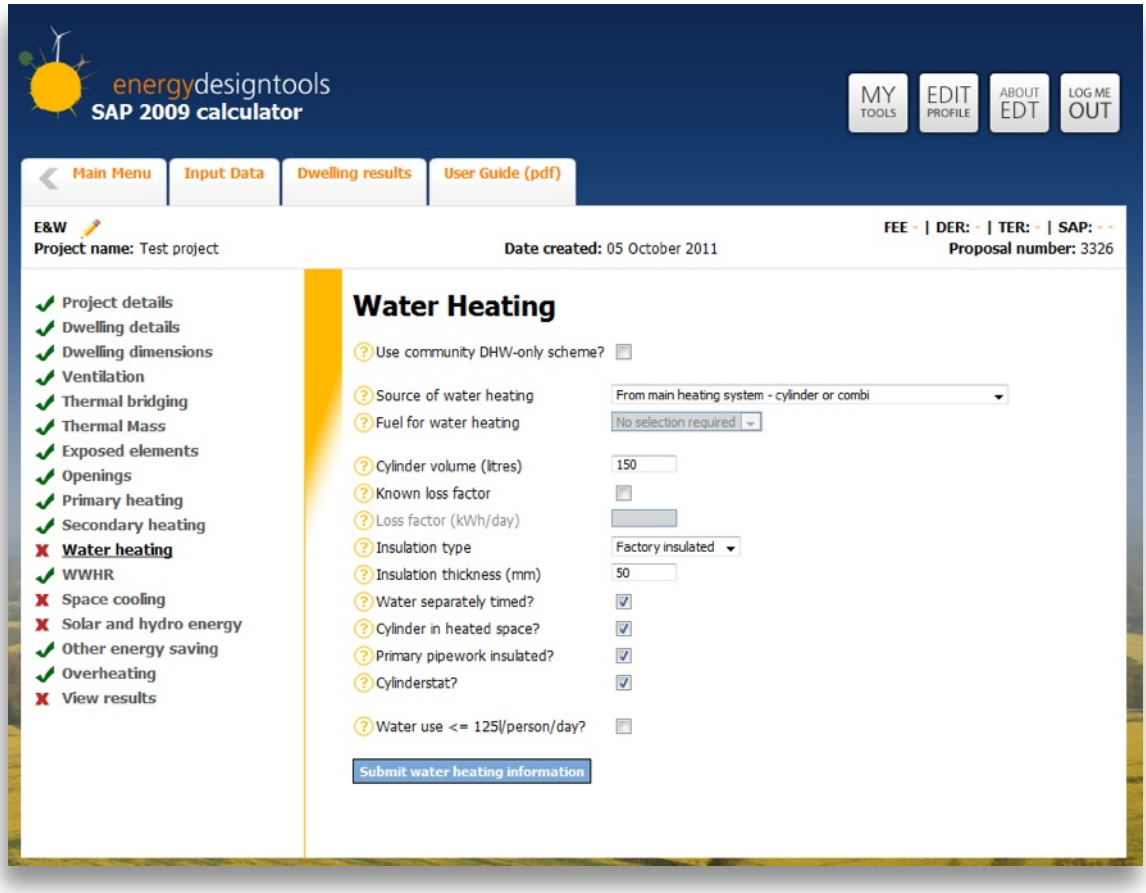
1. From the main or secondary heating system (where applicable, depending upon the heating systems. This can be from an individual or a community heating scheme)
2. From a separate, DHW-only, community scheme
3. From a standalone water heat source (electric immersion, instantaneous gas or electric, range cooker etc)

<u>From main/secondary heating system</u>

To specify from the main or secondary system, select either “From main heating system” or “From secondary system”, where applicable. The relevant input boxes will be displayed below, depending upon the type of system (for example a combi boiler will ask whether there is a keep hot facility, a regular boiler will ask for cylinder volume and insulation arrangements)

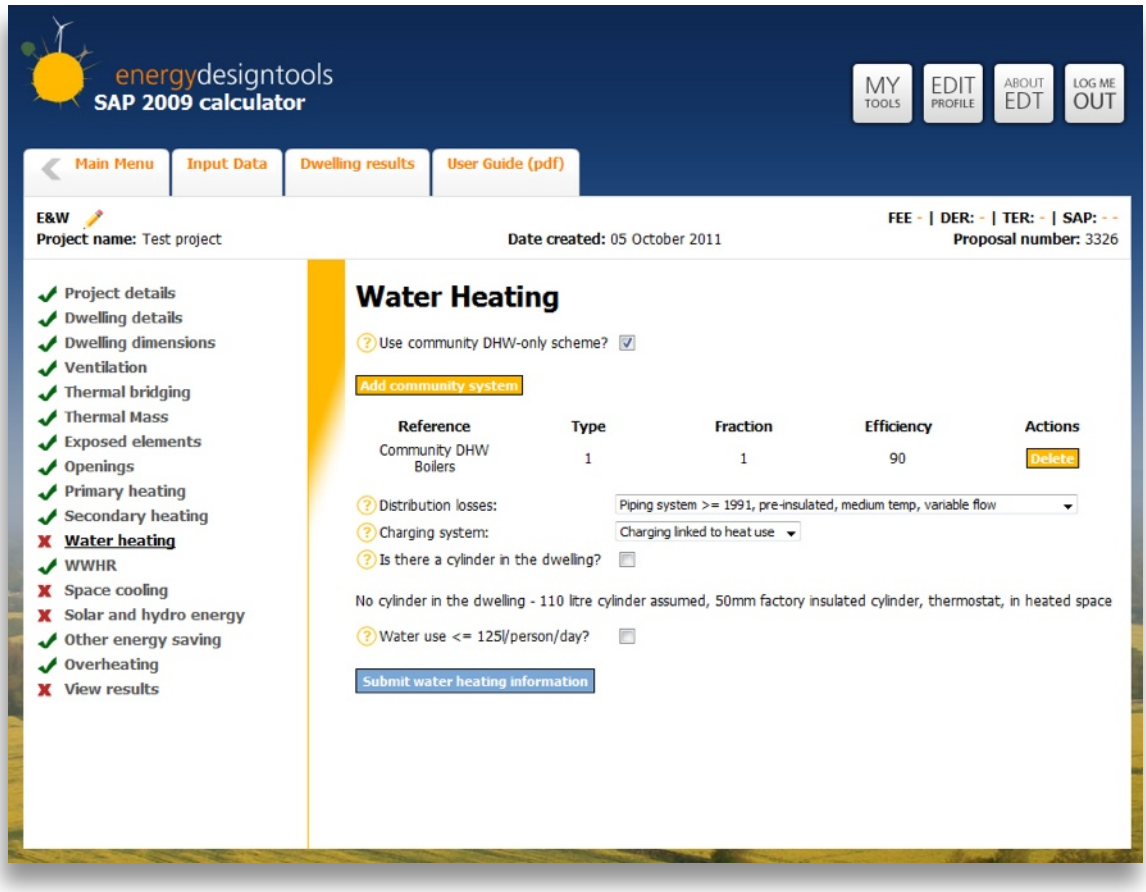
If you have specified a combi boiler from the boiler database then the details of this will already have been entered and you will not be able to change these (unless you alter the water heating system from being sourced by the main heating system).

In the case that the main system is a community system, you have the option of specifying whether there is a cylinder in the dwelling or not. If there is, then enter the details accordingly. If there is not, check this box and the system will assume a 110 litre cylinder in accordance with the sap specifications.



Screen shows water heating information completed for a regular boiler with hot water cylinder.

<u>From separate, DHW-only community scheme</u>
If this is applicable, check the box “Use community DHW-only scheme? “ this will toggle the display of the items to specify the scheme. As for the community space heating scheme, you can enter more than one heat source – click “Add community system” to open this page and enter the details. Once you have entered the details, select the distribution losses and charging system associated with the scheme, and choose if there is a cylinder in the dwelling or not.



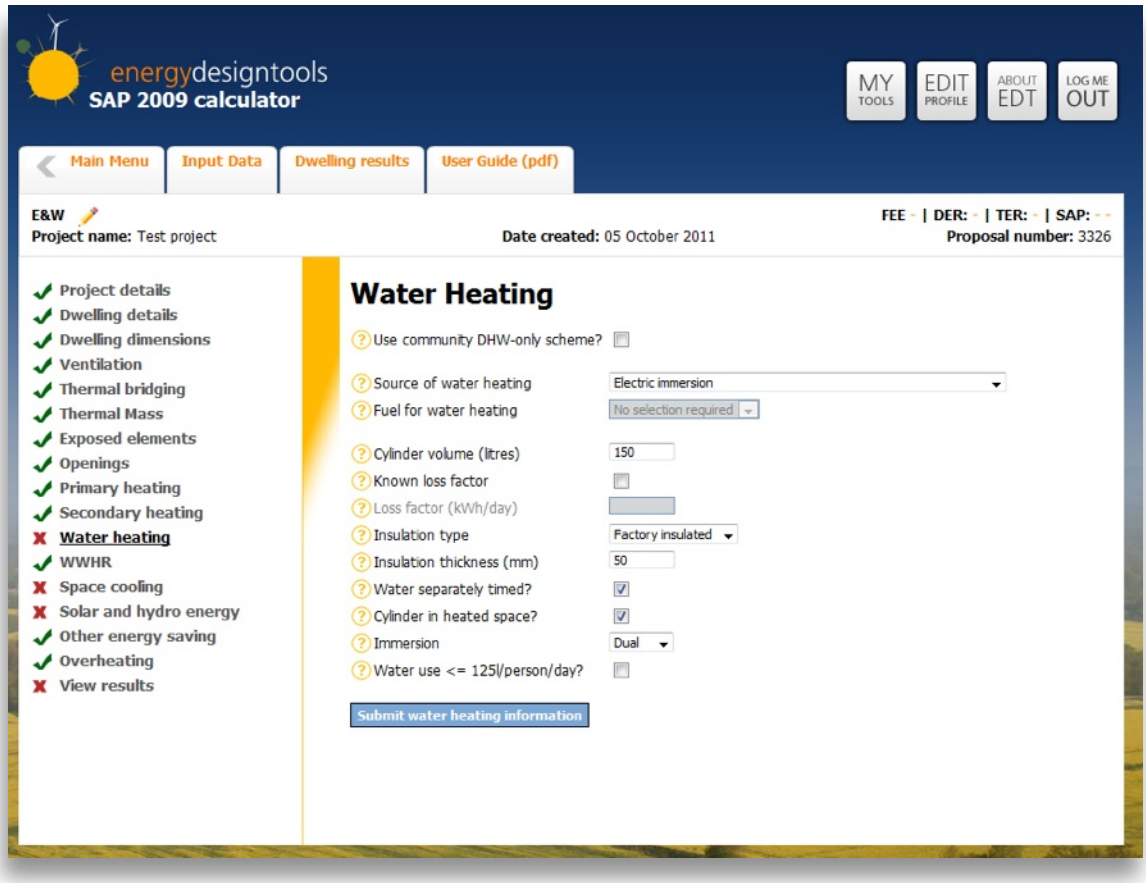
Screen shows specification of community DHW-only system.

Alternative standalone water system

There are a number of standalone options for water heating specified in the SAP tables. These include:

- Electric immersion
- Single/multi-point gas heaters
- Instant electric
- Gas/oil/solid fuel circulators
- Gas/oil/solid fuel range cookers

Select the appropriate option for the dwelling from the list. If a stored system is specified, you will be required to enter the information for the storage cylinder.

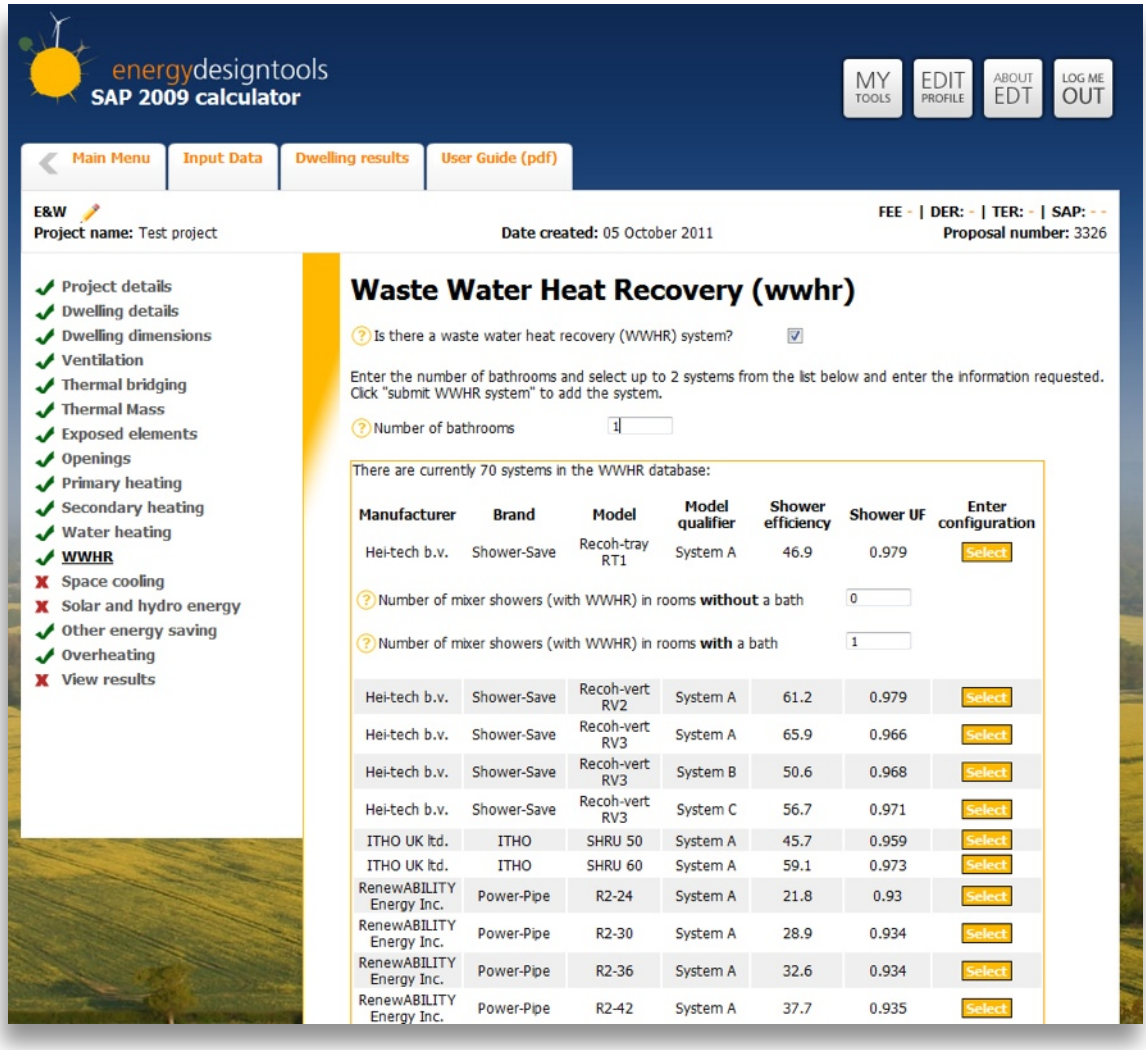


Screen shows typical entry for an immersion water heater.

If you are specifying in England and wales you also have the option of selecting if “design water use” (less than 125 litres/day) is specified in the dwelling. After completing the information, click “Submit water heating information” to progress to the next section.

12. Waste Water Heat Recovery (WWHR)

If the dwelling uses a WWHR system, click the checkbox to display the list of WWHR systems in the database (only systems in the database can be specified, there are no options for manufacturers data to be entered). Up to 2 WWHR systems can be specified in a project.



Screen shows typical selection of a WWHR system.

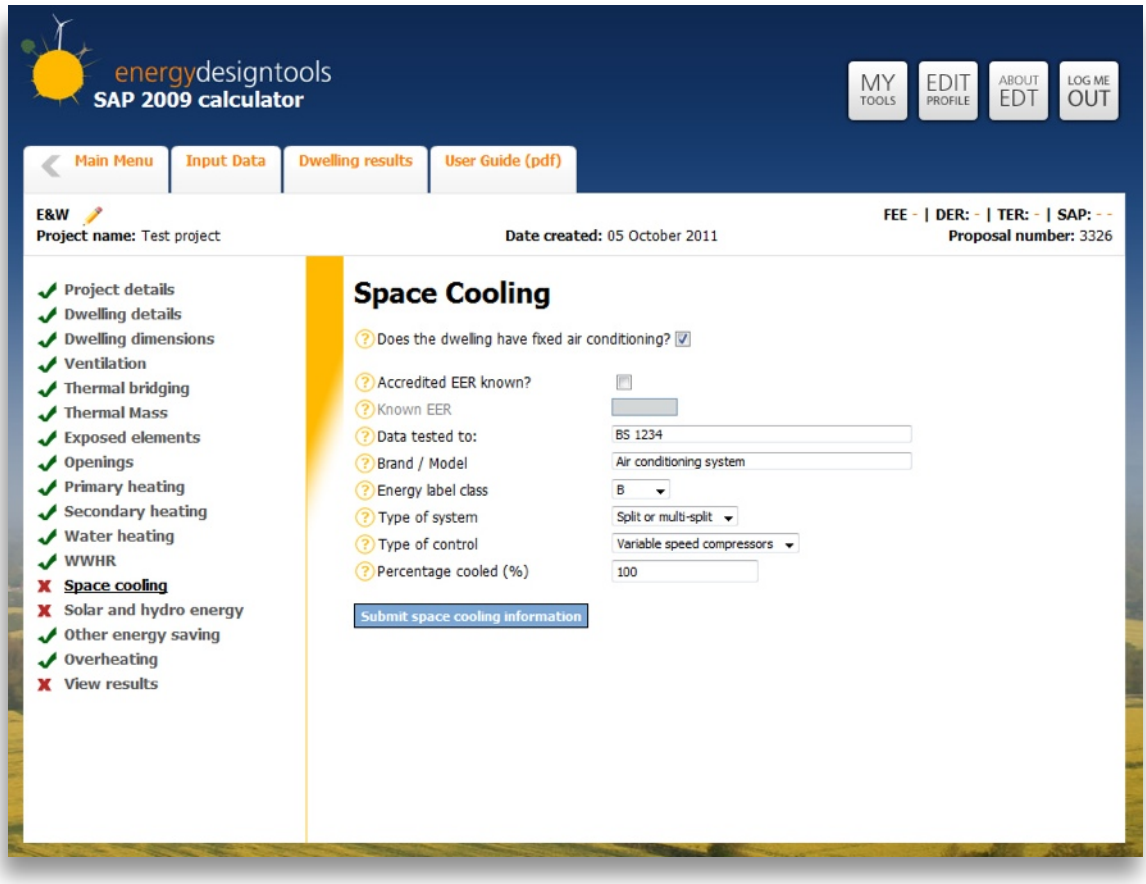
Enter the number of bathrooms in the property.

Select the WWHR system and enter the details as required.

Click “Submit WWHR information” to save and progress to the next section.

13. Space Cooling

This section allows you to enter the details of any fixed air conditioning system in the dwelling. If there is no system, leave the box “Does the dwelling have fixed air conditioning?” unchecked.



Screen shows air conditioning system specified without a known EER.

If there is a system you can either specify using the known Energy Efficiency Ratio (EER), or from other information.

Known EER

Click the “Accredited EER known” box and enter the EER, the standard the data has been tested to, and the brand / model of the system

Unknown EER

An estimate of the EER can be made using the Energy label class and type of system, so these must be selected from the box.

In all cases, select the type of control (variable or on/off) and also the percentage of the dwelling that the system cools (a value between 1 and 100).

Click the “Submit space cooling information” button to continue to the next stage.

14. Solar DHW and Hydro Energy

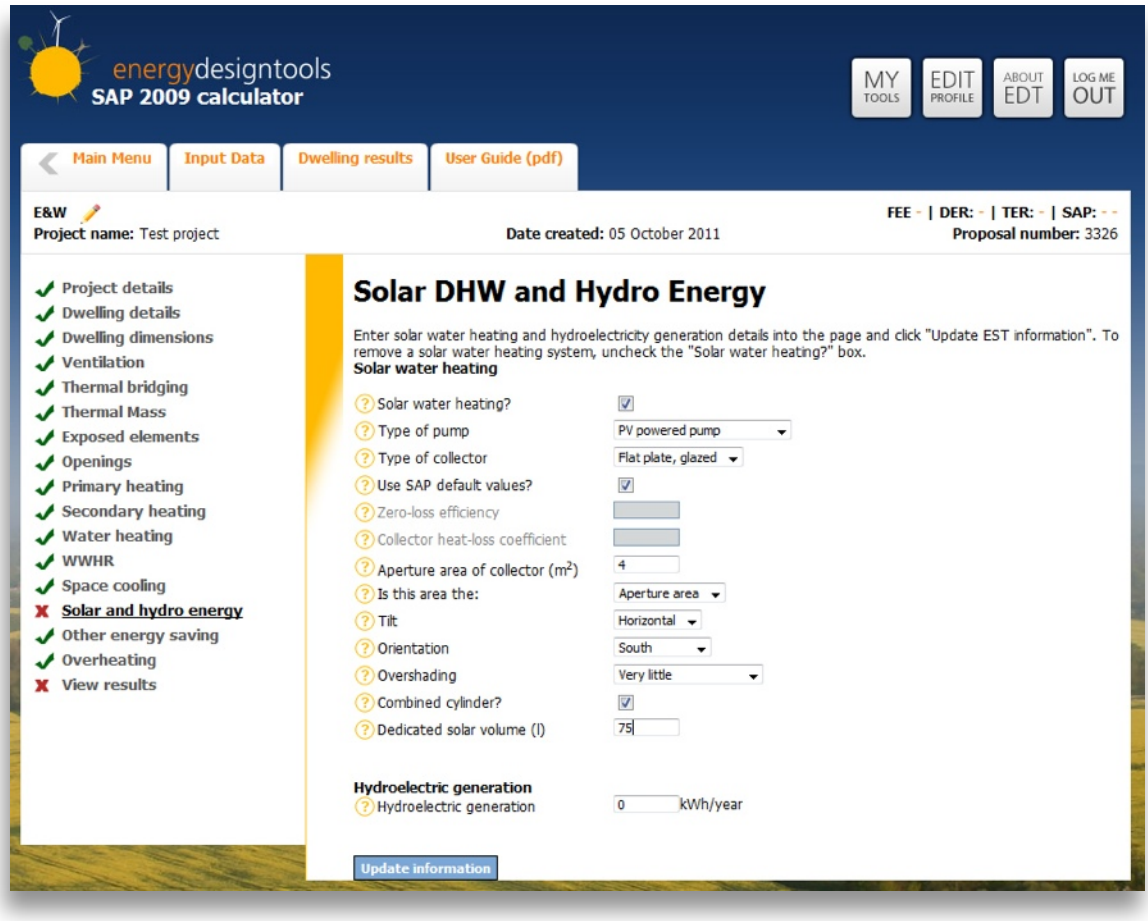
This section enables you to specify solar water heating and any hydro electric energy sources in the dwelling.

Hydroelectric energy

The procedure for this is simple – simply enter the amount of energy generated (in kWh/year) into the box. If you want to edit this, just change the value or remove altogether.

Solar DHW

Click the "Solar water heating" checkbox to toggle the display to allow you to enter the information.



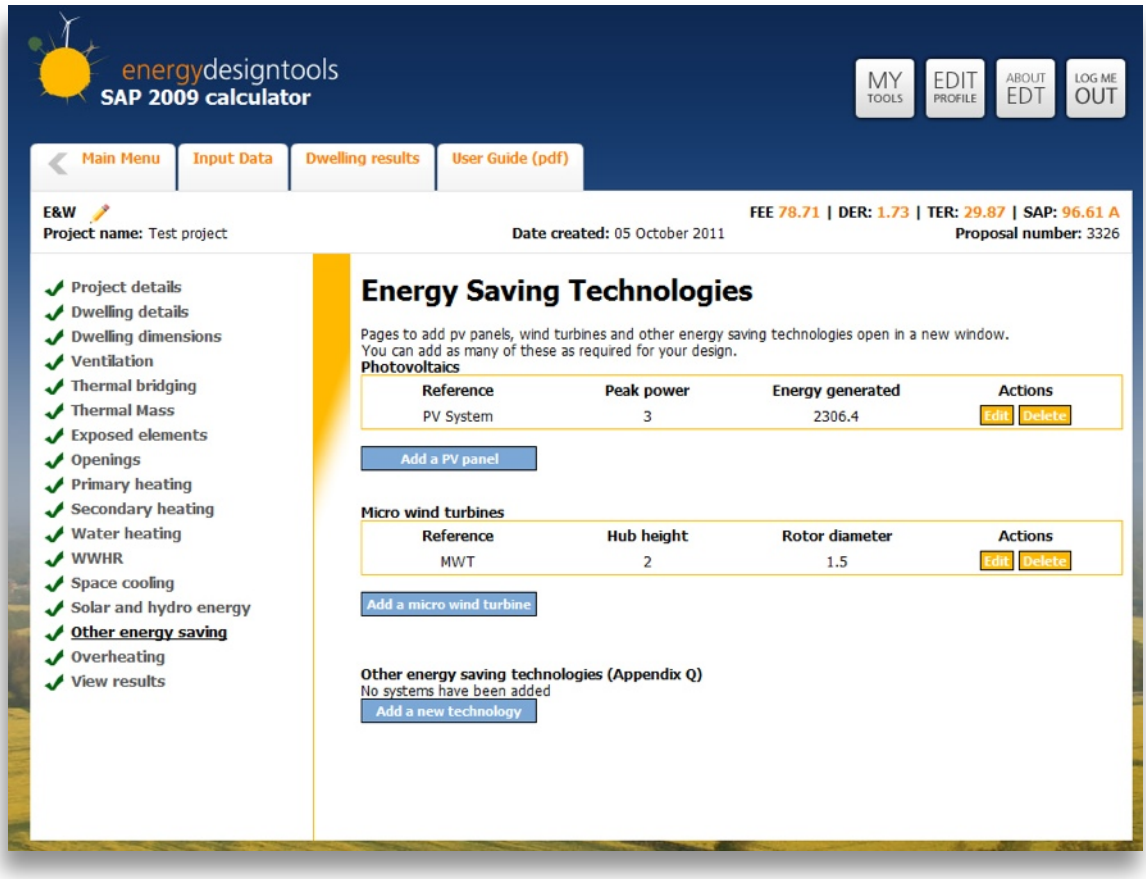
Screen shows specification of a typical solar water heating system.

Select the type of pump, type of collector and whether you wish to use SAP default values (if you don't, uncheck this box and complete accordingly from the manufacturer's data). Enter the area of the solar collector and select whether this is the aperture or gross area. Define the tilt, overshading and orientation of the collector and choose whether the cylinder is integrated into the main cylinder (if applicable) or standalone. Please note that you can only specify an integrated cylinder if your hot water system also has a cylinder. For combi boilers etc you must specify a standalone cylinder.

Click "Update information" to save the details for both Solar DHW and Hydroelectric energy and progress to the next stage.

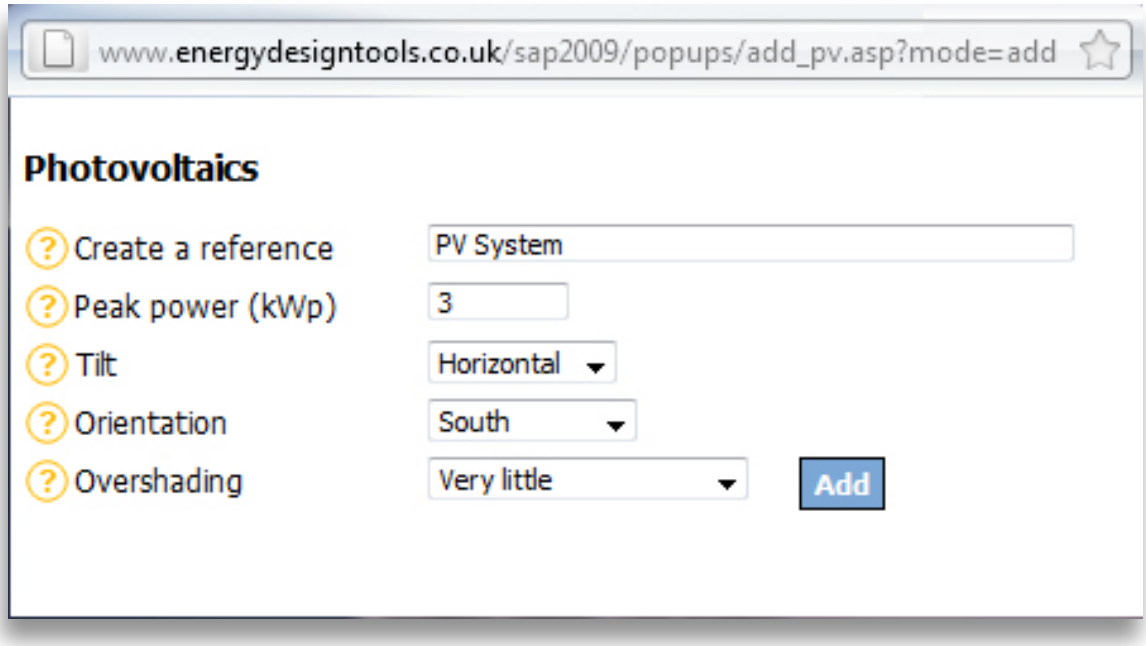
15. Other Energy Saving

This page allows you to enter and Photovoltaic panels, Micro wind turbines, or New technologies that your dwelling may use. Click the appropriate button to add a new system.



Completed EST page showing summary of systems installed into the project.

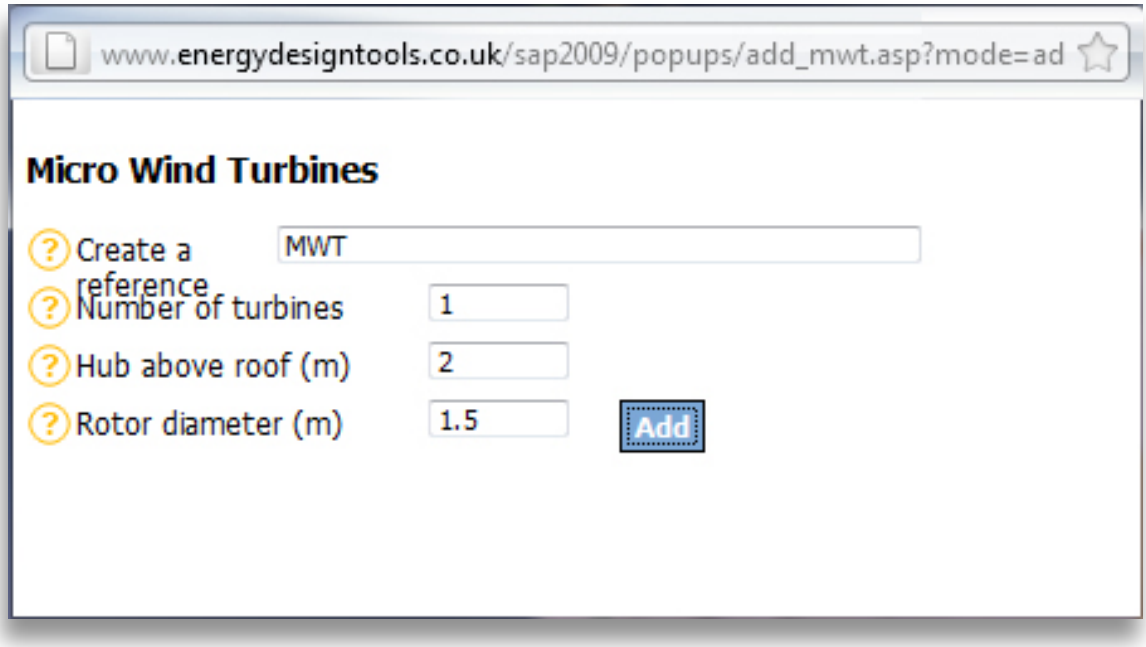
<u>Photovoltaics</u>



Specification of a PV system

To create a new PV panel, enter a reference, the peak power of the unit and its tilt, orientation and overshading. Click “Add” to submit the system. On addition the main screen will refresh to display this system, including any energy saved, which you can now edit or remove by clicking the appropriate button.

Micro wind turbines



Specification of a MWT system

Create a reference and enter the number of turbines with this specification, the hub height and rotor diameter. Click “Add” to submit the system, which will display on the main page. You can edit or delete this system by clicking the appropriate button.

New technologies

Technologies that are currently undefined in SAP can be entered using this system. Just enter a reference for the technology and the amount of energy saved/used and the fuels saved/used.

If the new technology can also amend the air change rates of the dwelling, then select the “Amend air change rates” box. Complete the values for each of the months.

Click “Add” to submit the system, which will display on the main page. You can edit or delete this system by clicking the appropriate button.

You can add as many of each of these technologies as you wish (or none at all). Once this section is completed, you should be able to progress to the final, “View results” section. Additionally, since all of the sections should now be completed, the Fabric Energy Efficiency (FEE), Dwelling Emission Rate (DER), Target Emission Rate (TER) and SAP Ratings should all appear in the top right hand of the page.

16. View results

Once all of the sections have been completed, the system can calculate the results for your dwelling. Information given on this final page includes:

- SAP rating and band
- DER
- TER
- FEE
- Environmental Impact rating and band
- Primary energy (total and area weighted)

You will also be able to generate output documents – these currently include coversheets, input data, compliance checklists and Energy Performance Certificates.